THE

JOURNAL OF GAS LIGHTING.

PUBLISHED MONTHLY.

No. 47, Vol. II.] LONDON, DECEMBER 10, 1852. [Price 1s., In America 35 Cents.

CONTENTS.

	PAGE
Circular to Gas Companies	469
Wright's Improved Ventilating Condenser	470
Communicated Articles:—	
The Chemistry of Gas Lighting	471
Testimonial to Mr. Stelfox	472
Midnight Operations of the New Gas Company in Sheffield	472
Fire Bars of Fire Clay	472
Table of the Discharge of Gas through Pipes	473
Correspondence:—	
Mr. L. Thompson on the Illuminating Power of Gas in the Metropolis	474
To T. Dakin, Esq., Chairman of the Great Central Gas Company	476
Register of New Patents:—	
Booth's Improvements in the Manufacture of Gas	476
Swarbrick's Improvements in the Manufacture of Gas Retorts	476
Legal Intelligence:—	
Bail Court—The Queen *v.* Tallis	476
Court of Exchequer—Tetley *v.* Easton and Amos	476
Rolls' Court—*Re* Hills *ex parte* the British and Foreign Gas Meter Company	477
Miscellaneous News:—	
Dr. Letheby's Third Report on the Gas supplied by the Great Central Gas Consumers' Company	477
Balance Sheet of the Strabane Gas Works	477
Report of the Directors of the London Gas Light Company	477
Patent Law Amendment Act, 1852	478
What has Liebig done for Science?	479
Blaydon	479
New Gas Companies	479
Oldham	480
Ruthin Gas	480
The British and Foreign Gas Meter Company	480
Rome	480
Odense (Denmark)	480
South Essex Gas Company	480
The Great Central Gas Company *v.* Tallis	480
Oporto	480
The Iron Trade	480
Substitute for Artificial Illumination	480
Exportations of English Coals to France	480
Coals in the Port of London	480
Coal Duties	480
Minutes of Evidence on the Lighting of the House of Commons	481
Share List	486
Price Current	488

TO CORRESPONDENTS.

W. H.—*Mr. Delane, the director of the Great Central Company, is father to Mr. Delane, of the* Times. *The reports which appear in that paper of the meetings of the Commissioners of Sewers are prepared by Mr. Haines, the Corporation reporter, to whom all rectifications should be addressed.*

Gas Light, Topsham.—*No application of the electric light at present before the public need cause any apprehension to gas companies.*

A Retort.—*Please send us your name and address.*

An Old Gas Man.—*The object we had in view, in inserting the letter of* "A Country Manager," *has been accomplished, and it is useless to multiply instances of abuse of the facility with which testimonials are obtained.*

NOTICES.

The Title-page and Index of Volume II. will be given next month.

Subscribers who have not paid their subscription for 1852 are requested to remit 12s. for the entire year, or 6s. for the half year.

The subscription is 10s. per annum if paid in advance, or 12s. on credit, payable in two sums of 6s. each, due in June and December of each year. All subscriptions commence from the 10th of January.

All communications and orders for Advertisements to be addressed to the Editor, 32, Bucklersbury, London.

Back numbers exceeding three months' date will in future be charged double price, unless six or more consecutive numbers are taken at the same time. Nos. 6, 15, 18, and 23, are out of print; and Nos. 24, 25, and 26, can only be had with the entire series, forming volume 2.

The Editor will be particularly obliged by his friends forwarding to him Notices of all Meetings, Trials, or Appeals, which it may be interesting to the Gas World to have reported.

Circular to Gas Companies.

The *London Gazette* of the past month has been, as usual at this period of the year, crowded with notices of intended applications to Parliament for new acts. Among them are rather more than the usual number of notices affecting gas companies, and one of them is of so novel and extensive a character that we give it entire. We understand the promoters are highly respectable and wealthy, and are intending to give the scheme of substituting gas as a heating agent for solid fuel a fair and honest trial, and that arrangements are in progress for an experiment upon a sufficiently extensive scale to determine its comparative cost and economical results. The following is a list of the notices:—

Blackburn Gas Company.—Amendment of act; extension of limits, and increase of capital.

Bristol Gas Light Company, and Bristol and Clifton Gas Light Company.—Amalgamation bill.

Bristol Gas Light Company.—Increase of capital, and extension of limits.

Ormskirk Gas Light Company.—Incorporation of a company for the supply of gas to Ormskirk, Aughton, Bickerstaffe, Barscough, Lathom, Halsall, and Scarisbrick.

Blackpool Improvement.—Power to construct gas works, or to purchase those of the Vegetable Gas Company, and to sell gas.

Dudley Gas Light Company.—Amendment of act; increase of capital, and further powers.

Devonport Gas and Coke Company.—Amendment of act; increase of capital, and borrowing powers, and arrangements with Devonport Plant-Leasing Company.

Lowestoft Water, Gas, and Market.—Power to construct gas works, or to purchase the Lowestoft Gas Works, and to supply gas.

South Shields Improvement.—Power to construct or purchase gas works, and sell gas, or contract for its supply.

Preston Gas Light Company.—Amendment of act; increase of capital, and extension of limits.

Shipley Gas Light Company.—Amendment of act; increase and regulation of capital, power to borrow moneys to erect new works, and further powers.

Plymouth Improvement.—Power to construct gas works, and sell gas, or contract for its supply.

Leeds Gas Light Company.—Amendment of acts; increase of capital.

Nottingham Gas Light Company.—Increase of capital, and amendment of acts.

Sunderland Gas Company.—Increase of capital, power to take a transfer of the Sunderland Subscription Gas Light Company, amalgamation of companies, and amendment of act.

The Gas Fire Company.—Incorporation of Company.—Application is intended to be made to Parliament in the next session for an act to incorporate a company to be called "The Gas Fire Company," or by such other name as may be deemed expedient, for the production of fires and heat by the agency of gas in dwellings and other buildings within England, Wales, and Berwick-upon-Tweed. And notice is hereby given, that it is intended by the said proposed act to enable the said company to purchase by compulsion or by agreement, and to hold lands and houses, and to levy and receive rates, rents, and remunerations, for the production of fires and heat by the agency of gas, and to open and break up turnpike roads, streets, highways, and other thoroughfares and places in England, Wales, and Berwick-upon-Tweed, for the purpose of laying down, placing, maintaining, removing, and repairing any pipes or other works or apparatus necessary or convenient for carrying the objects and purposes of the said proposed act into effect; and also to authorise the company to manufacture and supply gas for the purposes aforesaid, and to erect and construct all such buildings, gas-meters, and other works as may be necessary for the purposes aforesaid; and also to authorise any corporation or persons, now, or at any time hereafter, having the right to supply any city, town, district, or place, within England, Wales, and Berwick-upon-Tweed, with gas, to supply gas to the said company; and also to give to the said company all the powers and privileges mentioned and contained in the "Gas Works Clauses Act, 1847," so far as the same may be necessary for enabling the said company to manufacture and supply gas for the production of fires and heat by the agency of gas in dwellings and other buildings; and also such other privileges as are usually contained in acts for the establishment of gas companies, including a limitation of the liability of the shareholders to the amount of their respective shares. And it is also intended by the proposed act to vary or extinguish all such rights and privileges as may interfere with the objects contemplated by the proposed act, and to confer, vary, and extinguish other rights and privileges. And notice is hereby also given, that printed copies of the proposed bill will be deposited in the Private Bill-office of the House of Commons on or before the 31st day of December next.—Dated this 1st day of November, 1852.—Henry Wickens, Solicitor, 4, Tokenhouse-yard, Bank, London.

SPALDING IMPROVEMENT.—Power to purchase or lease gas works, and to supply gas.
IMPERIAL CONTINENTAL GAS ASSOCIATION.—Amendment of act, and consolidation of capital.
CHORLEY IMPROVEMENT.—Power to contract for a supply of gas.

No notice has been given for a bill amalgamating the City of London and Great Central Gas Companies, so that each of them must remain in their present position for another year.

The prospectus of a "Consumers' Hydro-Carbon Gas Company," for the supply of "the parish of Marylebone with gas of superior purity and illuminating power at 3s. 6d. per 1000 feet," has been privately circulated, with the view of testing the disposition of the consumers to patronise such a scheme. No names are put forward, except that of a captain of the Royal Artillery, who figures as secretary. The company is stated to be provisionally registered; and, on application at the proper office, we find that a company with this title was registered on Oct. 23 last, by the promoters, Mr. Samuel Clegg, jun., C.E., of No. 11, Buckingham-street, Strand, and Mr. Robert Richardson, C.E., of No. 26, Great George-street, Westminster. The object of the registered company is represented to be "the manufacture and sale of gas within or near the metropolis, north of the Thames." A passage in the prospectus, stating that "the principal portion of the required capital being already provided, subscriptions for shares will not be publicly solicited," places the project beyond the pale of our criticism at present; and so long as the promoters refrain from offering their shares to the public, and confine themselves to speculating with their own funds, they are safe from our comments. We shall not, however, fail to give a true account of the gas, whenever we can obtain it and test its value.

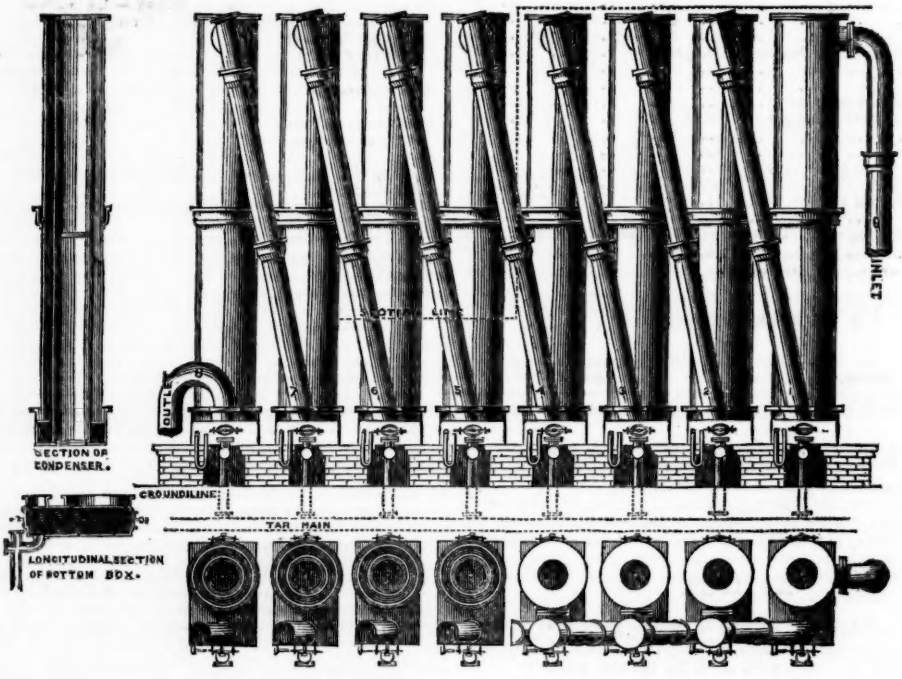
An esteemed correspondent, who has recently paid a visit to the Hydro-Carbon Gas Works at Southport, has favoured us with the following abstract of his observations. He found two beds of retorts in operation, each bed containing three diaphragm retorts set on the same level. Two retorts in each bed were charged with charcoal, and used for generating the water gas; the other retort was charged every four hours, with alternate charges of 56 lb. and 84 lb. of Boghead cannel, or 3 cwt. 3 qrs. per cannel retort per 24 hours. The men stated the average production of gas from a ton of cannel to be 33,000 cubic feet; hence

20 : 33,000 :: 3·75 : 6187 cubic feet

is the produce of three retorts, or 2062 feet per retort: a yield at least 75 per cent. inferior to that of retorts of equal weight when worked with Wigan cannel. The gas, so far as an experienced eye could judge by seeing it burn in the lamps and shops, was of fair illuminating power, though not equal to good Wigan cannel gas; but we understand it is subject to great fluctuation in this respect, some samples having, on analysis, given 19·15 per cent. of matter condensible by chlorine, while at other times it has been as low as 2·4 per cent. The former must have been Boghead gas but slightly adulterated with water gas, while the latter must have been deluged with it. The production of a gas of *uniform quality* is one of the difficulties of the process, for meeting which no provision exists in the apparatus now in use at Southport or elsewhere.

We give this month the commencement of a series of tables of the theoretical discharge of gas through pipes, according to the most approved *formula*. These tables indicate the maximum quantities of gas which each sized pipe will deliver, but allowances must be made, especially in the smaller sized ones, for accidental contractions arising from imperfect drainage into the syphons, the consequence of which may be a partial contraction of the bore of the pipe by the deposit of water. Several examples have come before us of late, where, for want of some data of this description, gas companies have been compelled to keep up an excessive pressure for the purpose of forcing gas through mains and services of obviously too contracted dimensions.

WRIGHT'S IMPROVED VENTILATING CONDENSER.



SCALE ONE-EIGHTH OF AN INCH TO A FOOT.

Although condensation is the simplest of all the operations of the gas manufacturer, and is consequently that upon which the least attention is generally bestowed, it is, nevertheless, one of the most important of them, and its abuse exercises a more serious influence over the quality of the gas manufactured than many gas engineers are at first sight prepared to admit. Its legitimate purpose is simply to precipitate the aqueous and opaque vapours contained in the crude gas, which, when cooled down to the ordinary temperature of the atmosphere, become deposited in the form of tar and ammoniacal liquor; but as it is now an ascertained fact that the bulk of the light-giving matters in coal gas are not permanent gases, but hydro-carbon vapours condensible by cold into naphtha compounds, it is clear that the carrying on of the operation beyond the point requisite for condensing the opaque vapours must be attended with a proportionate diminution in the illuminating power of the residue. Chemists and gas engineers are not yet quite agreed upon the exact point to which the cooling process should be carried; but it has been satisfactorily demonstrated that common coal gas undergoes a rapid diminution in its illuminating power when cooled below 50°, though cannel-coal gas will bear a lower temperature without a corresponding decrease in its luminosity. Mr. Lewis Thompson's original and elaborate investigations

have proved that, while the hydro-carbon vapours contained in Newcastle coal gas at 60° have a specific gravity of 3·2, those of Boghead cannel gas are only 1·21, and in Wigan cannel gas 1·77, and that the former begin to be precipitated at a higher temperature than the two last. The safe condensing minimum must, consequently, be regulated by the nature of the material employed in the manufacture of the gas.

A condenser should be so constructed, that while the minimum temperature at the exit is attained, as nearly as circumstances will permit, the cooling operation should never be continued beyond that point. The neglect of this condition involves the deposition of some portion of the heavy hydro-carbon vapours along with the tar, whenever the temperature of the atmosphere sinks below the safe cooling point; whereas its observance will effectually preserve these valuable illuminating agents. They may be afterwards temporarily deposited, during excessively cold weather, in the gasholders and mains; but whenever the temperature of the atmosphere rises above their vaporising point, they again become hydro-carbon vapours, and, as such, are taken up and carried off by the gas, adding to its luminosity. A perfect condenser must, therefore, allow of its cooling power being varied according to the temperature of the external air, and the quantity of gas passing through it. The original apparatus of a series of pipes immersed in water requires a large surface to compensate for the increase of temperature communicated to the water by the gas, and which is only partially obviated by permitting a small stream to run through it. The vertical air condenser, moistened by the dropping of water over the exposed surface of the pipe, acts only upon the external portion of the column of gas. Mr. Kirkham, the able engineer of the Imperial Gas Company, modified this by introducing a ventilating column concentric to a large pipe, by which the gas was divided into a thin sheet; and a powerful condenser, upon this principle, has been for some years in operation at the Pancras station of that company, in which the gas ascends and descends alternately in each successive column; and the condensing power may be varied by contracting or wholly closing up the top of the ventilating column.

Mr. Wright, the highly scientific engineer of the Western Gas Company, has lately improved upon Mr. Kirkham's system, by constructing a ventilating condenser, in which the gas enters the condensing column *at the top only*, while the air, by its rarefaction within the internal pipe, passes upwards, and hence a more effective interchange of heat takes place. Thus, if the air entering at the bottom has a temperature of 50°, and the gas entering at the top a temperature of 100°, and a certain quantity of each be passing, the air *might* leave the top at nearly 100°, and the gas at the bottom at nearly 50°. But if the gas entered from below at 100°, and the air with it at 50°, the gas could not possibly leave at 50°, but would probably do so at 75°. In addition to the superior effect thus produced, the construction is much simplified by the mode adopted for transferring the gas from the bottom of one column to the top of the next, an operation which Mr. Wright performs with ordinary socket pipes.

Some idea may be formed of the efficiency of this improved condenser from the following record of three experiments. In the second one, the covers might have been advantageously left on the first of the ventilating pipes, if common coal gas had been passing through, although the gas manufactured by the Western Company from Ramsay's Newcastle cannal coal would bear a lower temperature without perceptible decrease in illuminating power. These covers, however, give the means of eight adjustments of the condensing power, to be used as circumstances may require.

EXPERIMENT No. 1—passing 10,200 feet per hour.

Air, 54°.—Damp and cloudy.—Covers on ventilating pipes.

	Inlet.	Col. 1.	Col. 2.	Col. 3.	Col. 4.	Col. 5.	Col. 6.	Col. 7.	Col. 8.
Temperature of gas.....	107°	— 94°	— 84°	— 76°	— 69½°	— 64½°	— 60°	— 57°	— 54½°
Decrease in each column	..	— 13°	— 10°	— 8°	— 6½°	— 5°	— 4½°	— 3°	— 2½°
Accumulated effect of the successive columns..	..	— ..	— 23°	— 31°	— 37½°	— 42½°	— 47°	— 50°	— 52½°

EXPERIMENT No. 2—passing 11,120 feet per hour.

Air, 49°.—Fine and dry.—Covers off ventilating pipes.

	Inlet.	Col. 1.	Col. 2.	Col. 3.	Col. 4.	Col. 5.	Col. 6.	Col. 7.	Col. 8.
Temperature of gas.....	100°	— 78¾°	— 16½°	— 59½°	— 55½°	— 53¼°	— 51¼°	— 50¼°	— 49½°
Decrease in each column	..	— 21¼°	— 12½°	— 7°	— 4°	— 2¼°	— 1¾°	— 1°	— 1°
Accumulated effect of the successive columns..	..	— ..	— 33¼°	— 40¾°	— 44¼°	— 46½°	— 48¼°	— 49½°	— 50½°

EXPERIMENT No. 3—passing 12,400 feet per hour.

Air, 55°.—Rain.—Covers off ventilating pipes.

	Inlet.	Col. 1.	Col. 2.	Col. 3.	Col. 4.	Col. 5.	Col. 6.	Col. 7.	Col. 8.
Temperature of gas.....	103°	— 79°	— 67½°	— 61°	— 58°	— 56½°	— 56°	— 55½°	— 55°
Decrease in each column	..	— 24°	— 11½°	— 6½°	— 3°	— 1½°	— ½°	— ½°	— ½°
Accumulated effect of the successive columns..	..	— ..	— 35½°	— 42°	— 45°	— 46½°	— 47°	— 47½°	— 48°

The external column is 3 feet diameter, and 18 feet high; the internal one is 2 feet diameter, the ring of gas between the two being 5½ inches wide, with an area nearly equal to that of a pipe 26 inches diameter. The transfer of the gas from the base of one column to the top of the next is effected by 12-inch pipes. The total weight of the whole is about 27 tons, and the surface exposed 3200 feet.*

From these data, some general rules may be laid down for the dimensions of such condensers, according to the climate in which they are to be used, and the nature of the gas to be condensed.

* The small quantity of metal employed for so large a surface is due to the excellence and lightness of the castings furnished by Mr. Robert Jones, of Wolverhampton, the contractor for the condenser erected at the Western Gas Works.

Communicated Articles.

THE CHEMISTRY OF GAS LIGHTING.

(*Continued from page* 453.)

Hitherto we have spoken merely of the removal of the alkaline or ammoniacal impurities of coal gas, for which purpose it has been shown that the salts of lime and, no doubt, also of the other earths—baryta, strontia, magnesia, &c., with the exception of alumina—are better adapted than the metallic salts, such as the muriates and sulphates of manganese, iron, and zinc. As, however, we shall have occasion shortly to examine the extent of the difference caused by metallic oxides when contrasted with lime for the removal of the sulphuretted impurities of gas, it becomes necessary to enter into a full investigation of the nature and amount of the purification effected both by lime and by metallic salts and oxides. And this has become all the more necessary from the fact that of late it has been found convenient by certain parties to regard ammonia and sulphuretted hydrogen as the only impurities requiring removal, merely, we presume, because these are capable of easy detection and demonstration by test papers. Against so absurd and dangerous a doctrine we strongly protest, and, therefore, proceed to point out the vastly more energetic action which lime exercises upon the impurities of coal gas, over that which can be produced by any metallic salt or oxide whatever. Indeed, as will be shown, this superiority is so decided that we have no hesitation in declaring the complete and perfect purification of coal gas to be an utter impossibility, in a practical sense, without the free use of lime.

Taking impure coal gas as it issues from the condenser, the impurities requiring removal will be found to consist of ammonia, as aforesaid, sulphuretted hydrogen, and carbonic acid, in proportions which, when common Newcastle coal has been employed, may be taken at 1½ part of ammonia, 8 parts of sulphuretted hydrogen, and 25 parts of carbonic acid in every 1000 measures of the gas. It will be requisite to bear these proportions in remembrance, in order that the action of the various purifying agents may be thoroughly understood. From the above it appears that the quantity of ammonia present is not nearly equal to the saturation even of the sulphuretted hydrogen, and still less, therefore, to that of the carbonic acid also. Hence we find that neutral metallic salts, such as the sulphate of iron, do not remove the whole of the sulphuretted hydrogen, nor neutral earthy salts, such as the muriate of lime, the whole of the carbonic acid. If, however, the volume of ammonia equalled the conjoint volume of the sulphuretted hydrogen and carbonic acid, then any metallic salt having a neutral carbonate would effect the total purification of coal gas. The chloride or muriate of manganese, for example, would, under such circumstances, thoroughly purify coal gas; for then the decomposing elements would be in the exact proportion to form solid compounds—that is to say, the ammonia would combine with the whole of the muriatic acid of the oxide of manganese, leaving enough of this latter to unite to the carbonic acid and sulphuretted hydrogen with the production of carbonate and sulphuret of manganese. Consequently, three solid and neutral bodies would thus be generated—muriate of ammonia, carbonate of manganese, and sulphuret of manganese—which would contain the previous impurities of the gas. One great cause of the difficulty of purification arises, there-

fore, not from the presence, but from the absence, of ammonia; for this necessitates the employment of some other alkali or alkaline earth, of which lime is the cheapest. From this it may be seen how very absurd and unchemical it is to employ an acid for the removal of the ammonia, as this must give rise to an important increase in the amount of lime or other purifying agent. Yet patents actually exist for the purification of coal gas by means of acids!

The true mode of purification depends upon the employment of means for arresting the ammonia, in the first instance, by double decomposition; and we have demonstrated that the salts of the earths proper possess in this respect a very great advantage over the salts of the metals; but there is this very important difference between them:—the impurity removed with the ammonia by earthy salts is carbonic acid; that removed by metallic salts is sulphuretted hydrogen; for it happens that the affinity of lime for carbonic acid is greater than for sulphuretted hydrogen, whereas with metallic oxides the reverse is the case. It has often been regarded as an astonishing fact that gas may be deprived of its ammonia, so as to produce no effect upon turmeric or reddened litmus paper, and yet, after being transmitted through lime, abundant evidences of the presence of ammonia make their appearance, and the gas will then powerfully affect the test papers. This is particularly the case when acids or acidulous metallic salts have been used for the removal of the ammonia, and depends upon the fact that the supercarbonate of ammonia, with excess of carbonic acid, has no alkaline reaction. Thus, presuming the composition of impure coal gas to be as we have stated, and this gas to be passed through common commercial sulphate of iron, or "copperas," as it is called, and which not unfrequently contains an excess of acid, then the carbonic acid of the impure gas, being in great excess, carries off with it a portion of the ammonia, and the gas exhibits acid rather than alkaline properties; but if this gas be next passed through lime, so as to remove the carbonic acid, then the ammonia, thus set at liberty, manifests its alkaline disposition—the phenomena being exactly similar to those which occur with muriate of ammonia and lime.

Returning to the proportion of impurities above assigned to coal gas, we may now examine in what way these are affected when made to pass through muriate of lime in the one instance, and through neutral muriate of iron in the other. The ammonia, being assumed at $1\frac{1}{2}$ part in 1000 measures of the gas, will, when muriate of lime is employed, combine with its own volume of carbonic acid, and then, by double decomposition, give rise to the production of muriate of ammonia and carbonate of lime, as we have previously shown; but with muriate of iron, the ammonia will cause the removal of its own volume of sulphuretted hydrogen, and lead to the formation of sulphuret of iron and muriate of ammonia. Consequently, after the action of the first of these agents, the impure gas will contain less carbonic acid than before; whereas, after the action of the second, it is the sulphuretted hydrogen which will be found to have suffered diminution. Where lime alone is used for the subsequent purification of the gas, it does not materially influence the cost, whichever of the above processes is employed; but where oxide of iron forms part of the subsequent process, it is perfectly absurd to use a metallic salt in the first instance of purification, as this could only remove the sulphuretted hydrogen, which it is the object of the oxide of iron alone to remove. In practice, therefore, an earthy salt should either precede or accompany the employment of oxide of iron for purification. Following out the statement of impurities, we have thus got as far as the removal of the ammonia and part of the carbonic acid by a salt of lime, and the absorption of the sulphuretted hydrogen by the oxide of iron, or some other metallic oxide. The impurity still remaining in the gas is carbonic acid, the largest of all its impurities, and still present to the extent of $23\frac{1}{2}$ parts in 1000 volumes. To take away this, hydrate of lime is the only available agent, and the proper mode of using it is, beyond all question, in a dry-lime purifier.

And there is this very great advantage in favour of the aforesaid arrangement of muriate of lime, oxide of iron, and hydrate of lime, that it entirely obviates all smell and nuisance from the gas works. For the muriate of ammonia and carbonate of lime which result from the first operation are inodorous; the sulphuret of iron produced by the second is inodorous; and the carbonate of lime generated in the third is also inodorous, except a very faint smell of naphthaline. The only disadvantage is one hereafter to be discussed, viz., that the oxide of iron most certainly reduces the illuminating power of the purified gas, whereas lime alone has not this effect. In order that we may render ourselves quite clear in reference to the cause of the want of odour in the above arrangement, it is indispensably necessary to bear in mind the exact composition of foul lime, so as to contrast it with residuary lime, just referred to under the term carbonate of lime, and shown to result from the last process of our arrangement. Foul lime, as it is removed from the purifier, consists of an admixture of several salts, some of which, as the ferro-cyanate, sulpho-cyanate, and hydro-cyanate of lime, are in such minute quantities as to require no notice here; but there are others, such as the carbonate and the hydro-sulphate of lime, and the hydro-sulphate of ammonia, which are in considerable quantity, and constitute an important part of the total bulk. There is also a quantity of hydrate of lime in an uncombined state, and which may be said to be wasted. The analysis of these principal compounds shows that the salts exist in about the proportion which our estimate of the impurities in coal gas would indicate: that is to say, more than half the mass consists of carbonate of lime, nearly one-fourth of hydro-sulphate of lime, about one-fifth is hydrate of lime unacted on, and the residue contains the cyanogen, salts, and the silicious and other impurites of the limestone, with a variable proportion of hydro-sulphate of ammonia retained in the mass mechanically. With such a mixture, it is not surprising that an offensive odour is emitted on exposure to atmospheric air; for, in the first place, the hydro-sulphate of ammonia must pass into the air by a simple process of diffusion, whilst the hydro-sulphate of lime, being acted on by the carbonic acid of the atmosphere, will give rise to the formation of carbonate of lime, and a copious evolution of sulphuretted hydrogen gas. And it is in this latter particular that the use of oxide of iron has its great recommendation; for, as we have before stated, the affinity of oxide of iron for sulphuretted hydrogen is greater than for carbonic acid, whereas with lime the contrary is true. Hence the sulphuret of iron, not being decomposed by the carbonic acid of the air, emits no odour, whilst the sulphuret of lime is readily decomposed, and thus produces an abominable nuisance.

(*To be continued.*)

Testimonial to Mr. Stelfox.—We copy the following from the *Manchester Guardian* of the 6th ult.:—"Last evening, a meeting was held in the Mayor's parlour, Townhall, Salford, for the purpose of presenting a testimonial to Mr. James Stelfox. Among those present were Frank Ashton, Esq., the mayor; Mr. T. Chadwick, chairman of the gas committee; and several other members of the council, and the principal officers of the corporation. After an excellent cold collation had been partaken of, Mr. Chadwick presented to Mr. Stelfox a beautiful gold watch, with massive chain and seal, which had cost 50 guineas. The following was engraved within the case:—'Presented to Mr. James Stelfox, manager of the Salford Gas Works, by the members of the town council, his brother officers and servants of the corporation, and a few friends, as a testimonial of their respect and esteem, during the ten years he has been connected with the gas works. Salford, Oct. 22, 1852.'" Mr. Stelfox has lately been appointed as manager of the Belfast Gas Works, and we understand will be released from the management of the Salford Gas Works in the course of the week, to enter on his new situation, the duties of which, since Mr. Barlow's removal, have been discharged by Mr. William L. Robinson, of Leicester.

Midnight Operations of the New Gas Company in Sheffield.—We understand that some short time ago the representatives of the Sheffield Gas Consumers' Company applied for permission to lay their mains along Lady's-bridge, which is one of the county bridges, and that the result was a discharge from doing any such act. The discharge was given verbally by Mr. Butler, of Owlerton, the local surveyor of county bridges. Notwithstanding such discharge, the surface of the highway along the bridge was broken up on the north-west side, and the new company's mains were laid the whole length of the bridge. The operation occupied from about half-past eleven o'clock p.m. to seven a.m. The workmen were suffered to proceed without molestation. On the Thursday night following a line of parallel pipes was laid on the other side of the same bridge. We understand that a groove about six or eight inches deep has been cut into the masonry of the arches as the depository of the pipes. A special meeting of the commissioners of the Sheffield and Tinsley turnpike road was held at the Royal Hotel, to consider an application made by the new gas company for leave to lay their mains along portions of the Wicker. Twenty-one commissioners attended, and the following resolutions were passed:—"That no such consent as is applied for be given, and that the law clerk be instructed to protect the road from any encroachments by the Sheffield Gas Consumers' Company, and to take such proceedings for that purpose as he may think requisite; and that a copy of this resolution be sent in answer to Mr. Flintoff's letter. Also, that the law clerk be authorised to take all necessary measures for resisting any attempts which may be made to break up the surface of the road."—An attempt to lay a 10-inch main in Waingate, on the 6th inst., produced a serious collision between the rival forces which at one period threatened to end in a general riot. About noon on that day, the workmen of the new company were assailed by thirty or forty labourers, employed by the old company to fill up the trenches as fast as they were opened; in less than half an hour, the street was occupied by thousands, and the new company's men remained masters of the ground. On the 7th, the forces of the old company mustered in great strength, and successfully accomplished their purpose of filling in the trenches as opened in Willey-street. In the preceding night, some of the new pipes laid in Woodside-lane were dug up and broken; and the magistrates, on being applied to for redress, refused to act. At a special highway session, held on the same day, the surveyors were convicted, upon an information laid, for allowing the roads to be out of repair, and ordered thoroughly to repair them and pay the costs within a month.

Fire Bars of Fire Clay.—Mr. F. P. Dimpfel, of Philadelphia, has patented in the United States fire bars, composed of fire clay, soapstone, or other refractory substance, either alone or supported by a metallic casing. The objection to this plan for steam boilers appears to be the difficulty of making them thin enough to give a good draught. Thin bars and narrow spaces give plenty of air and space, prevent the small coal from falling through, and are economical of fuel. Fire-clay bars, however, may prove useful for gas retorts, and furnaces of various descriptions, where space is not an object.

TABLE

OF THE DISCHARGE OF GAS, IN CUBIC FEET PER HOUR, THROUGH PIPES OF VARIOUS DIAMETERS AND LENGTHS, AT DIFFERENT PRESSURES.

By Thomas G. Barlow, C.E.

(*The Specific Gravity of the Gas is estimated at* ·4, *Air being* 1.)

Diameter of Pipe, 0·5 in.

Length in yards	10.	20.	30.	50.	75.	100.	150.
Quantity delivered with 0·1 in. pressure	37·7	26·7	21·7	16·8	13·8	11·9	9.7
„ 0·2 „	53·4	37·7	30·6	23·8	19·5	16·8	13·8
„ 0·3 „	65·2	46·3	37·7	29·1	23·8	20·7	16·8
„ 0·4 „	..	..	..	33·7	27·5	23·8	19·5
„ 0·5 „	..	..	..	..	..	26·7	21·7

Diameter of Pipe, 0·75 in.

Length in yards	10.	20.	30.	50.	75.	100.	150.
Quantity delivered with 0·1 in. pressure	104·3	73·8	60·	46·6	37·9	32·9	26·9
„ 0·2 „	147·5	104·3	84·9	65·8	53·7	46·6	37·9
„ 0·3 „	..	..	104·3	80·9	65·8	57·	46·6
„ 0·4 „	..	..	..	93·2	75·9	65·8	53·8
„ 0·5 „	..	..	..	..	..	73·8	60·

Diameter of Pipe, 1 in.

Length in yards	10.	20.	30.	50.	75.	100.	150.
Quantity delivered with 0·1 in. pressure	214·	151·	124·	95·	78·	67·	55·
„ 0·2 „	302·	214·	175·	135·	110·	95·	78·
„ 0·3 „	..	..	214·	165·	135·	117·	95·
„ 0·4 „	..	..	..	190·	156·	135·	110·
„ 0·5 „	..	..	..	..	..	151·	123·

Diameter of Pipe, 1·25 in.

Length in yards	25.	50.	75.	100.	150.	200.	300.
Quantity delivered with 0·1 in. pressure	236·	167·	137·	118·	96·	84·	68·
„ 0·2 „	333·	236·	192·	167·	137·	118·	96·
„ 0·3 „	..	289·	236·	205·	167·	144·	118·
„ 0·4 „	..	..	..	236·	192·	167·	137·
„ 0·5 „	..	..	..	..	..	187·	152·

Diameter of Pipe, 1·5 in.

Length in yards	25.	50.	75.	100.	150.	200.	300.
Quantity delivered with 0·1 in. pressure	374·	264·	215·	187·	152·	132·	107·
„ 0·2 „	528·	374·	304·	264·	215·	187·	152·
„ 0·3 „	..	458·	374·	322·	264·	229·	187·
„ 0·4 „	..	..	..	374·	304·	264·	215·
„ 0·5 „	..	..	..	..	..	295·	239·

Diameter of Pipe, 2 in.

Length in yards	50.	75.	100.	150.	200.	300.	500.
Quantity delivered with 0·1 in. pressure	540·	441·	381·	311·	270·	220·	170·
„ 0·2 „	763·	623·	540·	441·	381·	311·	241·
„ 0·3 „	..	763·	665·	540·	468·	381·	296·
„ 0·4 „	..	..	..	623·	540·	441·	341·
„ 0·5 „	..	..	..	..	..	492·	381·

Diameter of Pipe, 2·5 in.

Length in yards	50.	75.	100.	150.	200.	300.	500.
Quantity delivered with 0·1 in. pressure	943·	770·	667·	545·	471·	335·	298·
„ 0·2 „	1335.	1090·	943·	770·	667·	545·	421·
„ 0·3 „	..	1335·	1172.	943·	819·	667·	516·
„ 0·4 „	..	..	..	1090·	943·	770·	596·
„ 0·5 „	..	..	..	..	..	861·	667·
„ 0·6 „	..	..	..	..	..	..	731·

Diameter of Pipe, 3 in.

Length in yards	100.	150.	250.	500.	750.	1000.	1250.
Quantity delivered with 0·1 in. pressure	1054·	859·	666·	471·	384·	333·	298·
„ 0·2 „	1440·	1214·	942·	666·	543·	471·	375·
„ 0·3 „	..	1487·	1153·	815·	666·	576·	529·
„ 0·4 „	..	..	1332·	942·	768·	666·	596·
„ 0·5 „	..	..	..	1054·	859·	744·	666·
„ 0·6 „	..	..	..	..	942·	815·	739·
„ 0·8 „	..	..	..	..	..	942·	845·
„ 1· „	..	..	..	..	..	..	942·

Diameter of Pipe, 4 in.

Length in yards	100.	250.	500.	750.	1000.	1250.	1500.
Quantity delivered with 0·1 in. pressure	2160·	1366·	966·	788·	683·	611·	557·
„ 0·2 „	3054·	1932·	1366·	1114·	966·	864·	788·
„ 0·3 „	..	2366·	1673·	1366·	1183·	1058·	966·
„ 0·4 „	..	..	1932·	1576·	1366·	1222·	1114·
„ 0·5 „	..	..	..	1761·	1526·	1366·	1245·
„ 0·6 „	..	..	..	1932·	1672·	1496·	1366·
„ 0·8 „	..	..	..	..	1932·	1728·	1576·
„ 1· „	..	..	..	..	..	1932·	1761·
„ 1·5 „	..	..	..	..	..	..	2160·

(*To be continued up to* 30 *inches.*)

Correspondence.

MR. LEWIS THOMPSON ON THE ILLUMINATING POWER OF GAS IN THE METROPOLIS.

"Magna est veritas."

Sir,—The deluge of congratulatory epistles poured upon me from all quarters of the kingdom, since the publication of my last letter, is proof enough that I made no false estimate of the real character and feelings of the people of Great Britain. These are evidently, as they have ever been, an honour to humanity and a triumph to civilization. The same love of truth and justice, the same ardent desire for fair play, the same abhorrence of trickery and oppression, which actuated the supporters of a Hampden, are still as vigorous and verdant in the heart of the British nation as when the keen sword of liberty gleamed brightly over the land, and set regal tyranny and exaction at defiance. The spirit of that age yet lives; and I am now sitting surrounded by written evidences that England's sons possess a more valid claim to their present title than can be gathered from the records of a heralds' college, or the mummeries of a dubious ancestral pedigree. Those sternly honest and high-souled sentiments which gave freedom to our forefathers, and which will neither permit their possessor to inflict an unmanly injury nor stand tamely to witness its infliction by another — these sublime sentiments, Sir, have gathered themselves into a shower of sympathies and fervent wishes for my success and welfare, as well as for my aid and encouragement. If I were a vain man, here, at least, is food enough to satiate any appetite of that kind. But in reality these things are not meant for me, and have no personal application whatever; nor do I look upon them in that light: they are a mere tribute to the principles which I profess, and indicate nothing more than the homage of a great and free people to the cause of truth and honesty. As such I value them, as such I gratefully acknowledge them, and as such I accept and will retain them to my dying hour. They shall constitute the fee which keeps me in the service of my country, and form a guarantee for the faithful discharge of my duty.

Thus circumstanced, I have considerable repugnance at alluding to the present conduct of my late cowardly assailants; but as this has somewhat changed for the better, and indicates a returning sense of shame on their part, I am able to do so with less pain than usual. The board of directors of the Great Central Gas Consumers' Company have now entrusted the diffusion of their false and defamatory accusations to their *honourable* secretary, Mr. Massey. This is business-like, at all events; and, though I cannot commend the practice, yet I freely admit the propriety of the choice. With Mr. Massey the question is one of "pudding or *no* pudding," pay or no pay; consequently, its solution requires but little knowledge of arithmetic. I should be sorry to stop Mr. Massey's preferment, or interfere with his prospects, more especially as his new employment is one in which, for the honour of humanity, I trust he will meet with no competition. There may be a doubt as to whether I am paid for the construction of my tables, but there can be no doubt whatever that Mr. Massey is paid to misrepresent them, any more than that Dr. Letheby is paid by the Great Central Gas Consumers' Company for his reports. These are facts, and I leave the inference to the public.

Mr. Lindley Murray was in the habit of proving, by well-chosen examples, that two negatives are equivalent to an affirmative. Mr. Secretary Massey seems desirous of proving that two lies are equal to the truth, or that a falsehood twice repeated becomes no falsehood at all. He perhaps forgets that the *veracious* chairman of his company has repeatedly tried the same experiment of late, and failed.

Reverting back to Dr. Letheby's paid-for reports—part of which, by-the-by, are, I believe, *not* paid for any more than my own—but reverting back, I say, to these reports, it grieves me to find in them a strong cause for censure. The respect and esteem I entertain for every member of my own profession induce me on the present occasion to use the mildest language possible compatible with the expression of an unfavourable opinion. Indeed, I wish less to criticise Dr. Letheby's past labours than to warn him in the most friendly manner against the contagious nature of "Dakinism." To a scientific man this is the road to ruin, the grave of his hopes, the "one candle" which will light him to lasting contempt and ridicule. As I know that Dr. Letheby has hitherto maintained an unblemished reputation for honour and probity, I am the more anxious that this should not be sacrificed on the altar of the expiring cheap gas "Moloch." I will not, therefore, make many comments, but rather arrange *seriatim* different portions of Dr. Letheby's reports, that they may speak for themselves, and expose their own bearing and bias.

In report No. 1, when speaking of the chemical quality of the Central gas, Dr. Letheby remarks, "I have submitted the gas to very careful examination, with a view of detecting two of the common impurities of coal gas, namely, ammonia and sulphuretted hydrogen, but I find that it is *particularly* free from these deleterious compounds." In report No. 2, matters are much changed, it would appear for the worse, as Dr. Letheby tells us, "With respect to the chemical quality of the gas, I have to state that it has on *several* occasions during the last month been contaminated with *sulphuretted hydrogen*, and that it has in some instances been *overcharged* with *bisulphuret of carbon*." But in report No. 3, everything seems tinted with a fine "*couleur de rose*" aspect, for we learn that—"The chemical quality of the gas has considerably improved since my last report. During a few days ['several occasions,' report No. 2] in the early part of August last, it contained traces ['been contaminated with,' report No. 2] of sulphuretted hydrogen, which were, *in all probability*, derived from residual (!) impurities in the pipes." Now, had the pipes previously belonged to any of the "old companies," these residual impurities might have been very conveniently accounted for. But whence came these "residual impurities," Dr. Letheby? "Ah! there's the rub." Could they who make "residual impurities" not make fresh ones? I sincerely hope that my warning may not be thrown away.

In speaking of the impurities of coal gas, it is customary to regard carbonic acid gas as amongst that class, and, indeed, this gas seems popularly associated with the expression "foul air" to such an extent as almost to render the meanings synonymous. The Central gas is, and always has been, largely contaminated with this impurity; yet Dr. Letheby frames his reports upon the chemical quality of this very gas without once mentioning the existence in it of carbonic acid. This does not, however, arise from his ignorance of the deadly and pernicious quality of carbonic acid gas, to which he alludes as part of the "noxious products of combustion," and against which, as a "hidden enemy," he wishes to guard the public. Is it not, then, unfair to pass over this noxious agent, and declare that, as regards impurity, his "remarks should be understood to apply to *all* the gas supplied to the metropolis, and not merely to that furnished by one particular company"? Dr. Letheby tells us that he has examined all the gases supplied to the City of London; and I am truly glad that he has done so, for I am not aware that he is paid by the City and Chartered Gas Companies; and, if he is not, then the anomaly of my position ceases, for I only do, on the same terms, one-third more work than Dr. Letheby. If he is willing to examine the gas of two companies gratuitously, what cause is there for wonder that I am willing to examine three? "*Ce n'est que le premier pas qui coute.*" But, if Dr. Letheby has examined the gases of the old companies, he must know that, as regards carbonic acid, they are much purer than the Central, and that in respect to illuminating power they are much higher. The concealment of these facts is what I complain of.

The improper use of gas-stoves is a subject upon which Dr. Letheby cannot expatiate too largely, in my opinion; but why are these stoves under certain circumstances dangerous? Is it not from the carbonic acid they evolve? and would not the Central gas, already contaminated as it is with this poison, evolve in the same space of time more carbonic acid than if it were properly purified like the gas of the old companies? Of what real use is it, then, to slur over this important question?

Again, as to the bisulphuret of carbon, Dr. Letheby insinuates that the gas of the old companies is equally contaminated with that of the Central. I formerly made, and have lately repeated, a most laborious set of experiments upon the amount of bisulphuret of carbon in the gas of the City Company, and that in the Central. The result shows that the Central gas contains at the very least SEVEN times as much bisulphuret of carbon as the gas of the City Company. I am quite prepared to enter into this inquiry with Dr Letheby, either at his laboratory or in my own, upon these conditions, that he will sign with me the report of our conjoint labours, and permit me to publish it. On the same conditions I will undertake to examine and report upon the photometrical state of the whole of the gases supplied to the City of London, so as to relieve Mr. Massey from his recently assumed labours as a placardist. My motto is "*nunquam non paratus*," and my offer, made in the most sincere language of honour and honesty. I know of no reason why Dr. Letheby should refuse it.

Before quitting the subject of gaseous combustion I deem it necessary to record some novel facts which have lately developed themselves as the fruit of a long and laborious investigation of several months' continuance. Most persons have, no doubt, noticed a peculiar odour present in localities where much gas is burnt, and which is at times much more remarkable than at others, giving rise to the supposition that the gas is occasionally more or less impure. In the examination of the cause of this phenomena I have been powerfully assisted by my friend, Mr. Alexander Wright, of the Western Gas Works; and to the employment of his apparatus for collecting the condensible products of combustion is mainly due the fact that the real cause or causes of that peculiar odour have been discovered. The smell in question arises from the accidental formation of a portion of aldehyde and formic acid; hence the disagreeable irritating effect produced upon the larynx and glottis of some persons, and which prevents them from remaining long in rooms lighted by gas. The aldehyde and formic acid are not, however, invariably produced in the same quantities, for this depends upon the state of the atmosphere—damp, foggy, or what is called "muggy" weather being that in which most aldehyde is generated. This, indeed, is precisely what theory would indicate, and is dependent upon the circumstance that combustion is at such times less perfect than when the air is dry and adapted for combustion. It is a well-known fact to glass manufacturers and others, who employ large furnaces, that dry frosty weather is that

in which their furnaces burn best, and even a common kitchen fire shows the same thing. In "muggy" weather, therefore, part of the gas passes off not thoroughly oxidised, being partly protected by the carbonic acid and nitrogen of the consumed gas and air, and partly by the presence of moisture in the air, which cools down the outside of the flame below the point of perfect combustion, giving rise to a state of things similar to that induced by spongy platinum with alcohol. Under these circumstances, aldehyde and formic acid pass off into the air of the apartment in conjunction with watery vapour and carbonic acid. If, however, these products be condensed by cold, the water obtained will be found to be impregnated with a peculiar acid, and a substance which becomes brown on the addition of a caustic alkali. The first is formic acid, the latter aldehyde; and when the greater portion of the water of the condensed fluid has been removed by standing over sulphuric acid in the receiver of an air-pump, the characteristic effects of these substances upon the salts of silver may be noticed. I have obtained distinct metallic rings of silver from the aldehyde thus produced, and have formed both the aldehydate of silver and that of ammonia. The formic acid may be separated without much difficulty by first combining it with an alkali, and after evaporation decomposing the salt by an acid. The detail of these operations is, however, too complex for recital in this place. The most practical part is the conclusion, that nearly the whole of these obnoxious agents may be got rid of, even in damp weather, by hanging a large ball of spongy platinum, or tissue of platinum wire, at such a height above the flame as to be partially red hot. By this means the unconsumed matters are mixed with atmospheric oxygen, and burnt under the catalytic influence of the platinum.

I consider the destruction of the aldehyde and formic acid generated during the combustion of coal gas as very necessary, for both of these substances irritate the fine membranes of the lungs and of the eyes, and must, consequently, tend to increase, or even to induce, diseases of the pulmonary and ophthalmic kind. From some experiments now in progress, I believe that a few only of the hydro-carbons in coal gas give rise to the formation of the above compounds, and that their excessive production in damp weather is not wholly unconnected with the method of purification adopted.

It will be seen, by referring to my photometrical table for the past month, that frequent changes have occurred in the illuminating power and specific gravity of one of the gases. This, in my opinion, has arisen from two causes, both connected with the weather. At this season of the year, it is not unusual to find great and sudden alterations of heat and cold during the course of a single day; if, therefore, great care is not taken in the management of the condenser, the amount of hydro-carbon precipitated from the gas by this instrument will occasionally prove excessive; and, as at such times the loss will always be further increased by condensation in the gas-holders and mains, it follows that the illuminating power of the gas must vary with the temperature of the air. And this has been so remarkably obvious within the last few weeks, that I intend henceforth to give a tabular statement of the highest and lowest points of the registering thermometer, as an illustration of the above argument. The other cause of change in the quality of the gas has, no doubt, arisen from the dampness of the coals caused by the late rains, and strongly inculcates the necessity of having proper storehouses for the coal, so that it may be used as dry as possible. Water in coals not only diminishes the heat of the retort and generates a non-luminous gas (hydrogen), but it also leads to the production of much carbonic acid, and, consequently, to an increase in the expense of the purifying account, for lime to effect its removal. The Central gas has been so outrageously contaminated with carbonic acid on some occasions lately, that its specific gravity has reached as high as ·443, at a time when its illuminating power was only 11·8!! A satisfactory proof of the correctness of my assertion, that the indication by specific gravity is worthless with impure gas. I have found as much as 4½ per cent. of carbonic acid on one occasion in the Central gas, and on another, 5 per cent. of nitrogen: this last looks like an accident from the exhauster. With the exception, at times, of a trifling amount of carbonic acid, the City gas has been extremely pure, and is singularly free from any serious contamination with the bisulphuret of carbon. The Chartered gas continues to maintain its previous reputation for absolute purity as regards carbonic acid; but I lately, for a few days, detected ammonia in it, and am told, on good authority, that this arose from the occurrence of an accident to the "scrubber." The Central gas has also contained ammonia, but from the presence of much carbonic acid, this cannot be detected by turmeric or reddened litmus paper; the vapour of muriatic acid, however, detects it.

Daily Record of Observations upon the Gases mentioned below, the specific gravity being taken by means of an air pump and flask with a delicate balance, the condensation by bromine, and the illuminating power by a spermaceti candle, burning about 120 *grains per hour, but always reduced to this gravity by calculation.*

Date.	CENTRAL COMPANY.			CITY COMPANY.			CHARTERED COMPANY.		
	Specific Gravity.	Illuminating Power in Standard Candles.	Condensation.	Specific Gravity.	Illuminating Power in Standard Candles.	Condensation.	Specific Gravity.	Illuminating Power in Standard Candles.	Condensation.
Nov. 10	·392	11·7	3·4	·418	14·9	4·2	·412	14·2	4·1
11	·403	12·4	3·6	·407	13·3	4·	·406	13·	3·9
12	·398	12·	3·5	·411	14·	4·1	·405	12·8	3·8
13	·410	12·9	3·9	·413	14·4	4·1	·408	13·1	4·
15	·414	13·8	4·1	·409	13·8	4·	·410	14·	4·1
16	·404	12·7	3·7	·409	13·9	4·	·409	13·8	4·
17	·409	13·	3·8	·412	14·5	4·2	·414	14·3	4·1
18	·404	12·6	3·7	·407	13·8	4·	·413	14·3	4·1
19	·404	12·6	3·7	·406	13·3	3·9	·406	13·	4·
20	·420	11·6	3·4	·400	11·5	3·4	·402	12·4	3·6
22	·441	12·4	3·6	·404	13·2	4·	·407	13·6	4·1
23	·443	11·8	3·5	·403	12·1	3·6	·402	12·4	3·7
24	·425	13·1	3·8	·415	13·9	4·	·413	14·6	4·2
25	·425	11·9	3·5	·408	13·0	3·9	·405	13·3	4·
26	·421	12·	3·5	·407	12·9	3·9	·407	13·7	4·1
27	·430	12·6	3·7	·408	13·	3·9	·403	13·	4·
29	·409	11·7	3·6	·402	11·7	3·5	·400	11·9	3·5
30	·401	10·3	3·2	·400	11·5	3·5	·391	10·6	3·3
Dec. 1	·406	12·4	3·6	·404	12·9	3·9	·399	12·8	3·9
2	·406	11·3	3·3	·403	12·8	3·8	·396	12·5	3·8
3	·402	12·6	3·7	·410	13·6	4·	·413	13·8	4·1
4	·401	12·	3·5	·409	13·7	4·	·416	14·	4·1
6	·404	11·6	3·4	·407	13·2	3·9	·408	13·3	4·
7	·412	11·9	3·5	·408	13·5	4·	·406	12·9	3·9
8	·411	11·8	3·5	·408	13·1	3·9	·404	12·7	3·8
9	·408	13·	3·9	·414	14·2	4·1	·408	13·9	4·
AVERAGE	·411	12·2	3·6	·407	13·3	3·9	·406	13·2	3·9

General or Monthly Average of the Heating Power of the Gases supplied to the City of London by the Gas Companies mentioned, between the 10*th of November and the* 9*th of December inclusive.*

	Grains of Water evaporated by 1 cubic foot of Gas burnt at the rate of 10 cubic feet per hour.
CITY COMPANY.....	2829
CHARTERED COMPANY	2830
CENTRAL COMPANY.....	2625

To obtain a Light equal to 250 *standard spermaceti candles, six to the pound, and each burning* 120 *grains per hour, it would cost with the—*

CENTRAL GAS ..... 3s. 11½d.
CITY GAS..... 3s. 7½d.
CHARTERED GAS ..... 3s. 8d.

Therefore, if the actual worth of 1000 cubic feet of
The CENTRAL gas be taken at 4s.
The CITY gas will be worth .. 4s. 4½d.
And the CHARTERED gas ..... 4s. 4d. } per 1000 cubic feet.

No. 7 A, *Pancras-lane, City, Dec.* 9, 1852.

LEWIS THOMPSON, M.R.C.S., &c., Consulting Chemist.

TO THOMAS DAKIN, ESQ.

CHAIRMAN OF THE GREAT CENTRAL GAS COMPANY.

SIR,—As a shareholder in the Great Central Gas Company, I naturally feel anxious for its permanent prosperity, to secure which it is necessary that the accounts should be plain and accurate. But, as a plain man, I confess I do not comprehend the last quarter's account, and will, therefore, feel much obliged and enlightened if you will explain the following figures.

It appears by the revenue account that you paid "To gas purchased for the summer quarter ending June 30, 1852, £4798. 13s. 3d;" that you paid for various items of expense, such as directors, salaries, wages, rates, taxes, &c., £2087. 0s. 3d.; and you also state the annual rental to be £40,000 per annum. Now, if all the quarters of the year were alike, we should multiply the £4798. 13s. 3d., paid for one quarter's gas, by 4, which would amount in the year to £19,194. 13s.; but, as the consumption and cost of gas for the two winter quarters are at least twice as much as for the two summer ones, we must add twice £4798. 13s. 3d., being £9597. 6s. 6d. more, to the account, making a total of £28,791. 19s. 6d. which we should have to pay for gas only, so that the year's account will actually stand thus :—

Cost of gas for two summer quarters.....	£ 9,597	6	6
Cost of gas for two winter quarters, being double	19,194	13	0
Total for gas.....	£28,791	19	6
Add to this :—			
Trade expenses of £2087. 0s. 3d., for one quarter, multiplied by 4, being four quarters.....	8,348	1	0
Four quarters interest on loan and debentures of £66,000, at 5 per cent.....	3,300	0	0
	£40,440	0	6

So that, according to your own figures and accounts, all our rental of £40,000 is more than absorbed for gas and expenses, without leaving a single shilling for dividend. Please, then, to explain how we can pay 10 per cent out of profit under these circumstances, and you will much oblige,

Your obedient servant, A. R.

London, Nov. 26, 1852.

[The position in which the last balance of this company is viewed by the writer of the above did not escape us when we alluded to this subject last month. We preferred, however, to deal with undisputed facts and figures rather than assume any, or infer them from the accounts before us. Had we been otherwise disposed, we might have fairly doubted whether the assumption of a rental of £40,000 per annum might not have been equally dubious as the previous assertion that it amounted to £53,000 at the corresponding period of 1851. The reckless nature of the system upon which this company is conducted may be judged of from the fact that the gas sold only produces 3s. $1\frac{68}{100}$ upon the quantity purchased and paid for. This is clear from the following figures :—

Gas purchased £4798. 13s. 3d. ÷ 1s. 9d. = 54,841,000 feet.
Gas sold..... £8607. 17s. 7d. ÷ 54,841,000 feet = 3s. $1\frac{68}{100}$.

But, as it is known that a considerable quantity is sold at 4s., a much larger quantity must be sold at a considerably reduced rate to bring the average to the low price above mentioned. The following cannot be very far from the real state of the case for the quarter ending June 30 :—

23 million feet to private consumers at 4s.	£4600
32 million feet to public lights at 2s. 6d.....	4000
	£8600

and, as the public lights are now being supplied by other companies, we have strong presumptive evidence that the statement with regard to the present gas rental is another example of "Dakinism."]

Register of New Patents.

GEORGE ROBINS BOOTH, of the Wandsworth-road, for "*Improvements in the manufacture of gas.*" Patent dated May 8, 1852.

Mr. Booth's improvements consist in manufacturing vegetable gas from seeds, leaves, fruits, and stems of plants, instead of employing the oils, gums, or resins, obtained therefrom in such process. Any seeds, or parts of plants, capable of yielding oils or gums from which gas may be produced, may be used in this manner, and the form of apparatus or retort employed may be very much varied; the patentee prefers, however, to project the oily seeds on to a highly heated surface, as being in practice an effectual mode of working and enabling the gas to be made in small quantities as required for use. A portion of oil will be found to be condensed in the pipes leading from the retort, which may be economically employed in the generation of gas.

JOHN SWARBRICK, of Blackburn, in the county of Lancaster, firebrick manufacturer, for "*Certain improvements in the method of manufacturing retorts used for gas and other purposes, and in the apparatus connected therewith.*" Patent dated May 22, 1852.

The inventor takes clay, as dug from the pit, and, if it contains coal or other refuse, burns it until the coal is reduced to ashes; or, if no coal exists in the clay, then he mixes ashes with it, or other varieties of clay, until a suitable material for his purpose is obtained. He then grinds this with just sufficient water to produce a stiff doughy mass, instead of adding as large a proportion as usual. Having taken a mould of the size required (and it is preferred that the moulds should be used in sections two to three feet long, with flanges for uniting them with each other), and placed it in an upright position, he introduces a core-bar into it, which he wedges firmly into the centre; he then rams the stiff clay into the space between the mould and core, and, withdrawing the wedges, fills also the space occupied by them with the clay. The core-bar is then raised by a lever or screw, another section of mould joined to the first, the wedges replaced, and the operation of ramming in clay repeated until the required length of retort is produced. Retorts formed in this manner are dry enough to be at once removed to the oven, and when baked will be found to be free from cracks or fissures.

Legal Intelligence.

BAIL COURT.—THURSDAY, NOV. 25, 1852.

(*Sittings in Banco, before* Mr. Justice CROMPTON.)

THE QUEEN *v.* TALLIS.

Mr. Sergeant SHEE appeared, in answer to a rule obtained on the 8th of November, to show cause why a criminal information should not be filed against Mr. John Tallis, for having, as was alleged, libelled Mr. Alexander Angus Croll, one of the sheriffs of London. The learned Sergeant, in addressing the court, said:—My lords, this is a rule, obtained by my learned friend Sir F. Thesiger, her Majesty's Attorney-General, calling upon my client, Mr. John Tallis, to show cause why a criminal information should not be filed against him for publishing certain statements respecting Mr. Alexander Angus Croll, one of the sheriffs of London. On behalf of Mr. Tallis, I have to express his great regret for the publication of the statements which have given pain to Mr. Croll, as being considered injurious to his personal character and honour. I have, on behalf of Mr. Tallis, to regret that any imputations should have been cast on Mr. Croll, and to state that there is no foundation for any of those imputations.

The ATTORNEY-GENERAL: I was quite certain, when my honourable and learned friend Sergeant Shee was entrusted with this case, that Mr. Tallis would do what was right in the matter. But, perhaps, I ought to mention that he has not exactly pursued the course which one would have expected from him, and which, I am sure, Sergeant Shee would have advised him to pursue, namely, to abstain, pending this rule, from the publication of that of which my client complained. But I told my learned friend that I was quite ready, on behalf of my client, to accept, on the responsibility of my friend Sergeant Shee, the apology, and, on the payment of the costs of the rule, to consent that the rule be discharged, the object of the Sheriff being to vindicate his character from the aspersions which have been endeavoured to be thrown upon him in exercising the duties of the important office which he fills.

The rule was then discharged with costs.

COURT OF EXCHEQUER.—SATURDAY, DEC. 4, 1852.

(*Sittings at Nisi Prius.*)

E. TETLEY *v.* HASTON AND AMOS.

This was an action for an alleged infringement of a patent, obtained by the plaintiff for improvements in machinery used for forcing up and impelling water and other fluids. There are few of our readers but will remember the celebrated "centrifugal pump," which was shown by Mr. Appold in the "Great Exhibition" of 1851. The fact of the interest which that pump excited, and, as was stated by the learned counsel for the defendants, the subsequent orders which were given to Mr. Appold, for whom the present defendants manufacture, aroused the present plaintiff. It will be further in the recollection of many that Mr. Appold did not take out a patent for his pump, but that he announced that "he gave the improvements and his invention to the world." The plaintiff, however, imagining that the principle used by Mr. Appold was similar to one for which he had himself taken out a patent some years since, made such an examination of the machinery as induced him to arrive at the opinion that his patent had been infringed. Hence the present action.

The main points of the defence were, that Mr. Appold had not attempted to "patent" the novelties of his invention; that the principle was not exactly the same as that employed in the specification of the plaintiff's patent; that, even if it did in some respects approach the principle of the plaintiff's, there was a different application; and that very many years prior to the plaintiff's patent there had been one taken out by a gentleman of the name of Hale, which went further than that of the plaintiff. That patent was obtained in 1832.

Sir A. COCKBURN, in his address to the jury for the defendants, said that, if they were to return a verdict for the plaintiff, the effect would be that the boon which Mr. Appold had conferred upon the world at large, by giving to it the free use of the valuable improvements he had made in the centrifugal pump, would be thrown away; because, should the verdict be for the plaintiff, that individual would then not only be able to take advantage of the publicity which Mr. Appold's invention had gained, but would be at liberty to apply all that gentleman's improvements to his own patent, and he, and he alone, would have the privilege of manufacturing these pumps. But he contended that the invention of Mr. Appold was not an infringement of the plaintiff's patent, and that its principles were very much nearer those described in the specification of Mr. Hale than those put forth by the plaintiff.

The LORD CHIEF BARON, in leaving the case to the jury, said the real question for their consideration was, whether this pump of Mr. Appold's was an infringement of the plaintiff's patent, and whether Hale's plan of having a wheel in a case included the principle set forth in the plaintiff's patent.

The jury, after some consultation, returned a verdict for the defendants.

ROLLS COURT.—Wednesday, Dec. 8, 1852.

RE HILLS, EX PARTE THE BRITISH AND FOREIGN GAS METER COMPANY.

This case came before the court by way of appeal from the decision of the Master, whereby Mr. Hills was placed on the list of contributories, under the Winding-up Acts, to the liabilities of the British and Foreign Gas Meter Company. After the company was projected, it appeared that Mr. Hills was induced by his friend Mr. Hutchinson to take 10 shares therein, which were duly allotted to him, and the certificates, signed by two directors, were also sent. The company was completely registered on the 27th of January, 1847, but Mr. Hills did not execute the deed. On the 18th of May, 1847, however, a clerk of Mr. Hills, who had authority to sign for him in matters of no importance, signed the deed for Mr. Hills without his knowledge, purporting to do so by his authority, and because, he said, he thought it would be for Mr. Hills's benefit. On the 26th of April Mr. Hills paid £40 by way of deposit on his shares, and on the 3rd of July, 1847, he paid a call of £10, after he knew of the signature by the clerk. Subsequently, he wrote a letter to the manager of the company to say that he would not have anything more to do with the company; and this letter, it was contended, was notice that he rescinded the contract, which was then executory only, Mr. Hills not having signed the deed, and not then knowing it had been signed. Afterwards he discovered the signature, and, on the company being wound up, he insisted before the Master that he was not liable, positively averring in his affidavit that he gave no authority to sign, and did not know of it at the time. The Master, however, placed him on the list, and from this decision he now appealed.

Mr. R. Palmer for Mr. Hills; Mr. R. Daniel *contra*.

The Master of the Rolls was of opinion that the Master was right. The case was one in which the deed was completely registered, the shares taken, and the deposit paid, and £1 per share after he knew of the signature of the clerk. The letter in which he purported to rescind the contract was of no use.

The motion must be refused, with costs.

Miscellaneous News.

DR. LETHEBY'S THIRD REPORT ON THE GAS SUPPLIED BY THE GREAT CENTRAL GAS CONSUMERS' COMPANY.

TO THE HONOURABLE THE COMMISSIONERS OF SEWERS OF THE CITY OF LONDON.

Gentlemen,—I have the honour to present my report on the illuminating power and chemical quality of the gas supplied by the Great Central Gas Consumers' Company to the City of London during the last quarter.

Since the date of my last report I have made 276 experiments of the illuminating power of this gas. These experiments have been conducted in the manner last described, and they have been made, as usual, with three kinds of burners—namely, the act-of-Parliament argand, which consumes five cubic feet of gas per hour; a No. 4 fishtail; and an ordinary batswing: each of which has burnt at the rate of four cubic feet per hour. The candles employed have been wax and sperm, of six to the pound: the former consuming, on an average, 160·7 grains per hour, and the latter 130. The results of these investigations are as follows:—

1. During the whole quarter the argand has emitted a light equal to that of 15 wax candles of standard consuming power—that is, of 120 grains per hour; the lowest amount of light during the quarter has been equal to 12·72 candles, and the highest equal to 16·1. In conducting these experiments I have taken care to have the wax candles burning at their greatest intensity; this has been accomplished by turning the wick out of the flame, and so preventing the formation of a snuff or head of unconsumed carbon. When, however, the candle has been allowed to stand without interference for a period of twenty minutes, the average illuminating power of the gas has been as high as 17·4 of such candles, each consuming 120 grains of wax per hour.

2. The light evolved from the argand has been equal, on an average, to 12·31 sperm candles.

3. The light from the fishtail burner has been equal to 10·64 standard wax candles, and 8·66 sperm.

4. That from the batswing has been equal to 10·58 wax candles of standard power, and 8·51 sperm.

The specific gravity of the gas, estimated at 29 of the barometer and 60° of Fahrenheit, has ranged between 400·3 and 423·8, the average having been 412·3.

These results prove that the gas has been of good illuminating power—in fact, when measured by the standard wax candle burning at its greatest intensity, it has been just 25 per cent. higher than is required by the act of Parliament, and, when compared with the same candle burning in its undisturbed condition, it has been exactly 45 per cent. higher.

The chemical quality of the gas has been considerably improved since my last report. During a few days in the early part of August last it contained traces of sulphuretted hydrogen, which were, in all probability, derived from residual impurities in the pipes. Since that time, however, the gas has been perfectly free from this highly deleterious agent.

When, in my last report, I ventured to make a few remarks on the presence of this and another sulphur compound in coal gas, I did so in order that the public might be made aware of the fact that all the coal gas of this metropolis invariably contains one of these impurities, and sometimes both of them; that, by the combustion of these bodies, an acid is generated which has the power of exerting a most destructive influence on goods of a perishable nature, and of producing injurious effects on the health and comfort of those who inhale it. To these remarks I added a suggestion, viz., "That it is highly desirable, both for the sake of health and property, that some means should be taken to ensure a more perfect manufacture of coal gas, and that every attention should be paid to ventilation, so as to carry off the noxious products generated during its combustion." I intended that those remarks should be understood to apply to all the gas supplied to the metropolis, and not merely to that furnished by one particular company. In offering those remarks I considered that I was acting in accordance with the intentions of my appointment, and guarding the public against the incalculable mischief which must of necessity arise from the operation of what, to them, is a hidden enemy. I venture, therefore, again to submit this matter to your consideration; for I believe that the valuable and economical application of gas to heating as well as to illuminating purposes is only just beginning to be made available; and it appears to me to be of the greatest importance, both to the manufacturer of gas and the consumer thereof, that the products of its combustion should always be conveyed as speedily as possible into the open air. By directing attention to this precaution, I am quite sure that coal gas may be safely employed to any extent, either as a source of heat or light; and it is not too much to hope that the time is not far distant when its applications will entirely supersede the use of coal, and so be the means of rendering the atmosphere of this metropolis as free from soot and smoke as is that of any city in the world. If, however, attention is not paid to so important a precaution, the mischief arising from the combustion of coal gas will prove an insuperable barrier to its employment for any other purpose than that of giving light. Already I perceive that a number of gas stoves have been introduced to the public with the recommendation that they do not require a chimney, but may, like an ornament, be placed in any part of a room. In my opinion nothing can be more dangerous than such an insane application of so useful a material.

I have the honour to remain, your faithful servant,

London Hospital, Nov. 10, 1852. H. Letheby, M.D.

BALANCE SHEET OF THE STRABANE GAS WORKS, FOR THE YEAR ENDING DEC. 31, 1851.

Dr.—					*Cr.*—				
To amount paid for coals		£103	15	2	By gas at 10s. per 1000 feet	£336	1	0	
,,	gas pipes, fittings, &c.	41	5	4	,, meter rent, at 4s. per annum	18	19	0	
,,	six No. 1 meters, at 22s.	6	12	0	,, coke sold	7	10	0	
,,	lime	5	13	4	,, tar ,,	3	15	0	
,,	repairs, including one new retort	12	0	0	,, foul lime	1	11	1	0
,,	ground rent of works and manager's house	18	8	0	,, pipes and fittings	43	2	1	
,,	taxes	3	5	3	,, 81 public lamps, at £3. 5s. each	263	5	0	
,,	incidental expenses	4	2	0	,, coals in stock, viz.:—				
,,	interest on £1200	60	0	0	20 tons Lesmahago at 23s. 6d.	£23 10 0			
,,	salary and wages	115	6	0	10 tons inferior cannel at 14s. 9d.	7 7 0			
To balance in favour of works		350	8	10	20 tons Newcastle coal at 15s. 9d.	15 15 0			
							46	12	0
		£720	15	11			£720	15	11
					By balance in favour of works		£350	8	10

REPORT OF THE DIRECTORS OF THE LONDON GAS LIGHT COMPANY,

To the General Meeting of the Shareholders, held Oct. 27.

Your directors, in accordance with the usual practice, submit to you the balance sheet and half-yearly account, showing the result of the manufacture and distribution of the company's gas up to the 30th of June last.

During that period the proportion of gas obtained from coals carbonised in ovens is about one-ninth of the entire quantity. Separate accounts have been kept of the cost of manufacture by retorts and by ovens.

The want of an additional gas-holder for the storing, and of larger mains for the distribution, of gas has been severely felt during the past half-year. So soon, however, as the sanction of the extraordinary meeting of the company in July last was obtained, to raise money by loan, your directors entered into a contract for the erection of an 80-foot gas-holder, which is now in course of construction; they also ordered large main pipes, some of which have been, and others are being, laid down for the supply of districts where the great extension of the company's business urgently called for increased supply of gas.

During the summer, three additional ovens have been completed, and five are now in the course of construction: the former are undergoing the process of seasoning, and it is hoped that the whole will be brought into active operation in the course of a few weeks.

For the purpose of satisfying ourselves, and the shareholders generally, as to the quality of the gas produced by the ovens, your directors have, from time to time, availed themselves of the assistance

of Dr. Joseph Watson, to examine and test both its purity and brilliancy; and it is satisfactory to learn, from the result of his investigation, that the gas of the London Gas Company is equal to that of any company supplying gas of the same description,* and very superior to that generally supplied. Dr. Watson's report will remain, with the accounts, open to the inspection of the shareholders.

For the information of the directors, weekly returns are made of the cost of the oven manufacture: these returns have been embodied in one account of the cost of such gas from June 30 to the 2nd instant; and it will be satisfactory to the shareholders to know that, although the system is not yet fully developed, the result shows that the oven gas is produced at a cost of less, by more than one-fourth, than that of the retort gas.

Several causes have, however, hitherto delayed the beneficial results which your directors have felt themselves warranted in anticipating. Besides the circumstance that several items of expenditure have been unusually heavy in the past half-year, the reduction in the price of gas, and increased competition in some of the company's districts, have been felt severely; while the want of mains of adequate size (a want expressed to the shareholders at the last half-yearly meeting, and now nearly remedied) has checked the flow of gas to those districts where the demand has most increased; and, by rendering additional pressure necessary, has increased the loss from leakage. Nevertheless, looking at the diminished, and still diminishing, cost of manufacture under the oven system, the great increase of demand for gas, and the now corresponding increase of the company's means of supply, your directors feel that the realisation of the hopes they have held out is only delayed.

The warrants for the payment of the fixed dividend or interest on the new 6 per cent. first preference shares up to Sept. 30, and which became payable on the 15th instant, have been made out, and are now in the course of payment.

PATENT LAW AMENDMENT ACT, OCTOBER, 1852.

First Set of Rules and Regulations under the Act 15 & 16 *Vict., c.* 83, *for the Passing of Letters Patent for Inventions.*

By the Right Honourable Edward Burtenshaw Lord St. Leonards, Lord High Chancellor of Great Britain; the Right Honourable Sir John Romilly, Master of the Rolls; Sir Frederic Thesiger, her Majesty's Attorney-General; and Sir Fitzroy Kelly, her Majesty's Solicitor-General: being four of the Commissioners of Patents for Inventions under the said act.

Whereas a commodious office is forthwith intended to be provided by the Crown as the Great Seal Patent-office; and the Commissioners of her Majesty's Treasury have, under the powers of the said act, appointed such office as the office also for the purposes of the said act.

All petitions for the grant of letters patent, and all declarations and provisional specifications, shall be left at the said commissioners' office, and shall be respectively written upon sheets of paper of twelve inches in length by eight inches and a half in breadth, leaving a margin of one inch and a half on each side of each page, in order that they may be bound in the books to be kept in the said office.

Every provisional protection of an invention allowed by the law-officer shall be forthwith advertised in the *London Gazette*, and the advertisement shall set forth the name and address of the petitioner, the title of his invention, and the date of the application.

Every invention protected by reason of the deposit of a complete specification shall be forthwith advertised in the *London Gazette*, and the advertisement shall set forth the name and address of the petitioner, the title of the invention, the date of the application, and that a complete specification has been deposited.

Where a petitioner applying for letters patent after provisional protection, or after deposit of a complete specification, shall give notice in writing at the office of the commissioners of his intention to proceed with his application for letters patent, the same shall forthwith be advertised in the *London Gazette*, and the advertisement shall set forth the name and address of the petitioner and the title of his invention; and that any persons having an interest in opposing such application are to be at liberty to leave particulars in writing of their objections to the said application at the office of the commissioners within twenty-one days after the date of the *Gazette* in which such notice is issued.

The Lord Chancellor having appointed the Great Seal Patent-office to be the office of the Court in Chancery for the filing of specifications, the said Great Seal Patent-office and the office of the commissioners shall be combined; and the clerk of the patents for the time being shall be the clerk of the commissioners for the purposes of of the act.

The office shall be open to the public every day (Christmas Day and Good Friday excepted), from ten to four o'clock.

The charge for office or other copies of documents in the office of the commissioners shall be at the rate of 2d. for every 90 words.

(Signed) St. Leonards, C. Fred. Thesiger, A.G.
John Romilly, M.R. Fitzroy Kelly, S.G.

Dated Oct. 1, 1852.

Patent Law Amendment Act, 1852, 15 & 16 Vict., c. 83.

By the Right Honourable Edward Burtenshaw Lord St. Leonards, Lord High Chancellor of Great Britain, and the Right Honourable Sir John Romilly, Master of the Rolls.

Ordered, that there shall be paid to the law-officers and to their clerks the following fees:—

By the Person opposing a Grant of Letters Patent.

To the law-officer	£2	12	6
To his clerk	0	12	6
To his clerk for summons	0	5	0

By the Petitioner on the Hearing of the Case of Opposition.

To the law-officer	£2	12	6
To his clerk	0	12	6
To his clerk for summons	0	5	0

By the Petitioner for the Hearing, previous to the Fiat of the Law-officer allowing a Disclaimer or Memorandum of Alteration in Letters Patent and Specification.

To the law-officer	£2	12	6
To his clerk	0	12	6

By the Person opposing the Allowance of such Disclaimer or Memorandum of Alteration, on the Hearing of the Case of Opposition.

To the law-officer	£2	12	6
To his clerk	0	12	6

By the Petitioner for the Fiat of the Law-officer allowing a Disclaimer or Memorandum of Alteration in Letters Patent and Specification.

To the law-officer	£3	3	0
To his clerk	0	12	0

(Signed) St. Leonards, C. John Romilly, M.R.

Dated Oct. 1, 1852.

Patent Law Amendment Act, 1852, 15 & 16 Vict., c. 83.

Ordered by the Right Honourable Edward Burtenshaw Lord St. Leonards, Lord High Chancellor of Great Britain.

All specifications in pursuance of the conditions of letters patent, and all complete specifications accompanying petitions and declarations before grant of letters patent, shall be filed in the Great Seal Patent-office.

All such specifications shall be respectively written upon both sides of a sheet or sheets of parchment, each page being of the size of eighteen inches in length by twelve inches in breadth, leaving a margin of one inch and a half on each side of each page, in order that they may be bound in the books to be kept in the said office; but the drawings accompanying such specifications, if any, may be made upon larger sheets of parchment than of the size of eighteen inches by twelve inches, leaving a margin of one inch and a half, as aforesaid.

The charge for office or other copies of documents in the Great Seal Patent-office shall be at the rate of 2d. for every 90 words.

(Signed) St. Leonards, C.

Dated Oct. 1, 1852.

Second Set of Rules and Regulations under the Act 15 & 16 *Vict., c.* 83, *for the Passing of Letters Patent for Inventions.*

By the Right Honourable Edward Burtenshaw Lord St. Leonards, Lord High Chancellor of Great Britain; the Right Honourable Sir John Romilly, Master of the Rolls; Sir Frederic Thesiger, her Majesty's Attorney-General; and Sir Fitzroy Kelly, her Majesty's Solicitor-General: being four of the Commissioners of Patents for Inventions under the said act.

The office of the Director of Chancery in Scotland, being the office appointed by the act for the recording of transcripts for letters patent, shall be the office of the commissioners in Edinburgh for the filing of copies of specifications, disclaimers, memoranda of alterations, provisional specifications, and certified duplicates of the register of proprietors.

All such transcripts, copies, and certified duplicates, shall be bound in books, and properly indexed; and shall be open to the inspection of the public at the said office, every day from ten to three o'clock.

The charge for office copies of such transcripts, copies, and certified duplicates, recorded and filed in the said office, shall be at the rate of 2d. for every 90 words.

The Enrolment-office of the Court of Chancery in Dublin, being the office appointed by the act for the enrolment of transcripts of letters patent, shall be the office of the commissioners in Dublin for the filing of copies of specifications, disclaimers, memoranda of alterations, provisional specifications, and certified duplicates of the register of proprietors.

All such transcripts, copies, and certified duplicates, shall be bound in books, and properly indexed; and shall be open to the inspection of the public at the said Enrolment-office every day (Christmas Day and Good Friday excepted), from ten to three o'clock.

The charge for office copies of such transcripts, copies, and certified duplicates, enrolled and filed as aforesaid, shall be at the rate of 2d. for every 90 words.

No warrant is to be granted for the sealing of any letters patent which contains two or more distinct substantive inventions.

A provision is to be inserted in all letters patent in respect whereof a provisional and not a complete specification shall be left on the application for the same, requiring the specification to be filed within six months from the date of the application.

No amendment or alteration, at the instance of the applicant, will be allowed in a provisional specification after the same has recorded, except for the correction of clerical errors or of omissions made *per incuriam*.

The provisional specification must state distinctly and intelligibly the whole nature of the invention, so that the law-officer may be apprised of the improvement, and of the means by which it is to be carried into effect.

The fee to be paid for every duplicate of such letters patent as may have been destroyed or lost shall be £1.

Where the applicant desires his letters patent to extend to any of the colonies, he must specify in his petition for the same the particular colony or colonies to which he desires it to extend; and when the applicant shall give notice of his intention to proceed with his

* At what Hibernian university did Dr. Joseph Watson graduate? It scarcely required a Ph. D. to make the discovery that a certain gas is equal to any other "gas of the same description."

application for letters patent, the law-officer to whom such application is referred shall hear him or his agent upon such extension; and the said law-officer shall make his report to the Lord Chancellor thereon. And no warrant for letters patent containing such extension shall be made unless the Lord Chancellor shall allow the same.

(Signed) St. Leonards, C. Fred. Thesiger, A.G.
John Romilly, M.R. Fitzroy Kelly, S.G.

Dated Oct. 15, 1852.

Ordered by the Right Honourable Edward Burtenshaw Lord St. Leonards, Lord High Chancellor of Great Britain.

Every application to the Lord Chancellor against or in relation to the sealing of letters patent shall be by notice, and such notice shall be left at the commissioners' office, and shall contain particulars in writing of the objections to the sealing of such letters patent.

(Signed) St. Leonards, C.

Dated Oct. 15, 1852.

Patent Law Amendment Act, 1852.—Supplementary Rules.

By the Right Honourable Edward Burtenshaw Lord St. Leonards, Lord High Chancellor of Great Britain; the Right Honourable Sir John Romilly, Master of the Rolls; Sir Frederic Thesiger, her Majesty's Attorney-General; and Sir Fitzroy Kelly, her Majesty's Solicitor-General: being four of the Commissioners of Patents for Inventions under the said act.

Whereas, by order of the Commissioners, dated Oct. 15 last, the applicant desiring his letters patent to extend to any of the colonies, is directed to specify in his petition for the same, the particular colony or colonies to which he desires it to extend;

And whereas many petitions left at the office of the commissioners, before and after the date of the said order, pray for the extension of the letters patent to all her Majesty's colonies and plantations abroad;

It is ordered, that in every such case the applicant or his agent shall leave at the office of the commissioners a notice in writing, either specifying the particular colony or colonies to which he desires his letters patent to extend, or withdrawing altogether his application to extend his letters patent to the colonies; and no reference of such petition shall be made to the law-officer for his warrant for the sealing of letters patent until such notice shall have been left at the said office.

(Signed) St. Leonards, C. Fred. Thesiger, A.G.
John Romilly, M.R. Fitzroy Kelly, S.G.

Dated Nov. 8, 1852.

WHAT HAS LIEBIG DONE FOR SCIENCE?

To review the discoveries of men is a task of great importance, and is most essential; for, if this were not done by some one, many a genius and hardworker would pass away and be forgotten, while their plagiarists would indisputably receive that halo which should have encircled their names. Having thus far premised, we enter upon the question heading this article, and which has been so repeatedly asked us by correspondents, "What has Dr. Liebig done for science?" Some assign almost every great discovery in chemistry to the German professor, while others consider him immensely overrated, and stoutly deny that he ever made a grand discovery; or, in other words, hint that his celebrity has been won with borrowed plumes. If Liebig really was a discoverer, and had added any truths to science, such men as Berzelius would not find fault with him. The Swede regarded him as "a weed" in the field of chemistry, and, shortly before his death, stated that time, the unraveller of all mystery, would sooner or later unfold the true merits of M. Liebig. This review we will endeavour to make impartial, and we will not "set down aught in malice," but will take from the very best authorities on the subjects we broach. The writer is a friend of Dr. Liebig, and last year was his pupil; but that will not prevent him neglecting the rights of others. He cannot bear witness to his own impartiality, of which others must be the best judges, but he can at least testify to the spirit in which he has sought to write—no partisanship. We believe all will admit that Liebig's fame has been gained principally by his agricultural discoveries and writings—*i. e.*, returning to the soil what is taken from it by the crop, laying great stress upon mineral ingredients and the manufacture of *specific* manures. As regards the theory of *mineral* ingredients and *specific* manures, he ought not to have the slightest credit, if we believe the following from a Scotch work on agriculture:—"While Liebig, a *foreigner, has obtained the credit of being the first* to present the subjects of specific manures and the mineral ingredients of plants, and which he did *so lately* as 1840, *there were persons in our own country* whose attention had been devoted to those particular subjects. Mr. Grisenthwaite, of Nottingham, in 1818, published the doctrine of specific manures, and of the existence of saline ingredients in plants; and in 1830, in the second edition of his 'New Theory of Agriculture,' he devotes a whole chapter to the exposition of his views on specific manures. He writes, when treating of the grain of wheat:—'In that grain there always exists, as has been stated, a portion of *phosphate of lime. It is the constancy of its presence* that proves, beyond reasonable doubt, that it answers some important purpose in the economy of the seed. It is never found in the straw of the plant; it does not exist in barley, or oats, or peas, although grown on the same land, and under the same circumstances, but, as has just been observed, *always* in wheat. Now, to regard this *unvarying discrimination* as accidental, or to consider it as useless, is to set at defiance the soundest principles of reasoning that philosophy ever bruited. *If phosphate of lime had sometimes only been found in wheat, or if it had been discovered in barley or clover*, then we might have concluded that the whole was accidental—that it in no way whatever assisted the formation of the perfect grain, nor contributed to promote the general design of it. They who can oppose these conclusions will depart from a method of reasoning long established in every department of human knowledge—a method to which the Baconian philosophy directs us, and to which we must have recourse, whenever we are desirous to explain the cause of physical effects. As little attention (he continues) has hitherto been paid to these saline bodies—at least, as they regard the subject of vegetation, and much as they respect the operations of husbandry—I have, for the sake of distinction, called them *specific manures. Hereafter, when a more complete analysis of vegetables* shall be made, it is probable that a nomenclature, founded on their specific substances, may at least classify, if not particularise, every kind of plant. Already we know there are several vegetables which *exercise the power of selection;* and it is reasonable to infer that, when investigation shall have more fully laid open the secrets of physiology, then the uses and designs of this selection will be rendered apparent, and the propriety of regarding it in practical husbandry completely established.' This reasoning was sound then, is sound at the present day, and could not be better *expressed* by even Liebig himself. On the beneficial effects of the employment of specific manures to agriculture, Liebig does not express himself more clearly and *firmly* than did Mr. Grisenthwaite in 1830; and it should be borne in mind that it was he who, so long ago, *applied the term specific* to this class of manures."

With respect to fabricating manures, he owns the false step he took by becoming a manufacturer, "and outraging the dignity of pure science, and disgusting and alienating many of his admirers."

We now come to the uric acid compounds—an investigation in which Wöhler was conjointly engaged. If rumour speaks true, Wöhler made all the experiments and discoveries, and Liebig, by publishing, ran away with all the glory. "The chemist of Göttingen" is an admirable manipulator and theorist, as the writer can testify, and his extraordinary modesty has prevented him obtaining that place in the public eye which Berzelius long since awarded him.

The Ethyle theory is not Liebig's; it is the discovery of his pupil Kane. Three or four prominent examples are sufficient for our purpose. From them we will let the reader judge of "what M. Liebig has done for science." We have heard it stated that Professor Liebig is jealous and envious of all competitors, and they are legion; and his malice is so great at times that he would sacrifice anything to satisfy it. He was and is at loggerheads with nearly all the famous chemists of his day—Berzelius, Mitscherlich, Dumas, Mulder, Kane, Fritzsche, and, until lately, he was with Dr. Lyon Playfair; but the shrewd Scot has gained a position so far beyond his master, that even the demi-god of Giessen is obliged to bow to it.

The following remarks, from the *Athenæum*, corroborate what we have stated:—"It is not on Mulder alone that Liebig inflicts his lash—Berzelius, Dumas, and many others, come in for their share. All who will not allow Liebig to chain their thoughts to his hypothesis become the objects of his anger and vituperation. The inference is, that he must be sensible of wanting sufficient practical evidence to support his views. He betrays weakness by his intemperate attacks, and will suffer the loss of much present honour in consequence. A cloud is already gathering on the brightness of his fame, and it is to be anticipated and feared that the obscuration will increase. Such is the natural result of those infirmities which enter into the constitution of Liebig's mind. His attacks are wanting in even ordinary discrimination, and it would seem that in his wrath he is frequently blind to the fact that he is writing *against his own published views.*" How gentlemanly is the tone, and how true the remarks, of our talented contemporary.

If Liebig has anything to be proud of, it is of his pupils. Three or four of them have, it is said, excelled their preceptor. We cannot do better, in summing up this article, than to compare the truly great Berzelius with the imaginary great Liebig. The former was a man who devoted his whole heart and soul to his science, regardless of the world, and never caring what it thought of him. The other only works enough to gratify his vanity; and he is so well acquainted with the tricks of the press, that nearly his whole fame rests with that ephemeral engine.—*Mining Journal.*

Blaydon.—A public meeting of the inhabitants of the thriving villages of Blaydon and Stella, near Gateshead, was held, on Wednesday evening, the 17th ult., in the spacious lecture-room of the new Mechanics' Institution (Mr. Dalton in the chair), to take into consideration certain proposals which had been made to erect a manufactory of gas. It was unanimously resolved that the proposal of Messrs. Joseph Cowen and Co., of Blaydon Burn, was highly eligible and deserving of support. A deputation was therefore named to call upon Messrs. Cowen, and inform them of the resolution of the meeting, and to solicit them to proceed with the works as soon as they conveniently could. It is fully expected that by the ensuing winter they will be in operation. At the same time, a committee was appointed to take into consideration the practicability of supplying the villages with pure water, and to ascertain what means could be employed to have the streets and footpaths put into a proper state of repair. For a considerable time they have been in a most disgraceful condition. But "Go ahead!" is now the motto in Blaydon. "More light," is their cry: "light and water." We shall have them aspiring soon to a mayor and corporation; and, when they have knocked down the old bridge, who knows but they may be clamouring for a custom-house!—*Gateshead Observer.*

New Gas Companies.—Three companies have just been completely registered, for the lighting of Horsforth, Stretford, and Newtown-limavady; and several others provisionally registered, for the lighting of Emsworth, Filey, Gorleston and Southdown, Horbury, Knighton, Matlock, Staindrop, Topsham, Walthamstow, and Wallasey. The Provincial and Continental Gas Company, alluded to in April last, has also been provisionally registered, with Sir A. W. Hillary as sole promoter; no list of directors or shareholders has yet been carried in to the Register's office.

Oldham.—The corporation of this town have resolved to purchase the gas and water works, and to manage them on public account.

Ruthin Gas.—We had several occasions of favourably mentioning the bright light produced by the gas; but it seems now that Mr. White's hydro-carbon gas has not had the pleasant effect upon the shareholders' pockets which was at first anticipated. However, the works are now stopped, and the town has receded to its former darkness; but these things, we are happy to say, are not to remain as they are, as the gasometer and other portions of the machinery are being altered so as to consume coal or cannel, articles not so fluctuating in price as resin.—*Chester Chronicle*, Nov. 20, 1852.

The British and Foreign Gas Meter Company.—This company was formed in the year 1845, its objects being the manufacture and sale of meters, the granting of licenses to use a patent purchased of Mr. Stephen Hutchinson, and the preparation of coal tar, &c., with the sale and disposal of such articles when manufactured. The company carried on business up to the close of the year 1848, when it became insolvent; and a petition was presented to the Court of Chancery to have the company wound up under the joint-stock companies' winding-up acts of 1848-49. That petition was granted; and very shortly afterwards, Mr. William Goodchap, of Southampton-buildings, was appointed the official manager, in order that the company's affairs might be investigated. That gentleman then made out a list of contributors, which has since been settled by the Master. He also found, from the books of the company, that there were several arrears of calls due, upon which the Master directed him to take the opinion of counsel, which was given to the effect that the calls had been illegally made, and that, therefore, nothing could be recovered under them. Upon that opinion being stated to the Master, he refused to admit the claim on the part of the company. Mr. Hutchinson and the secretary of the company also made large claims against the directors. To meet the liabilities of the company, a call of £7 per share was made on the 19th of October last, payable on the 1st of December.

Rome.—The following is an extract from a letter detailing the progress of the gas works in the "Eternal City":—"After four years' persevering endeavours, an Englishman has succeeded in obtaining a concession from the Papal Government for lighting Rome with gas. The last, but not the least, difficulty was to convince the Roman authorities of the harmless qualities of this combustible. The Papal municipality having heard of gas explosions, pipes bursting, &c., had associated this innovation to the dangerous inventions of this wicked age, and it was not until after much pondering and great council holding, that this point was got over. A second difficulty, however, immediately arose—as to the healthiness or unhealthiness of this spread of carbonic gases through the 'Eternal City.' A sanitary commission was, therefore, ordered to sit upon this important question. A portion of land had been chosen by the contractor outside the Porta del Popolo, on which to erect the works; but the commission, in its wisdom, disapproved of this site, being of opinion that the north wind, that blows occasionally, would drive the effluvia of gas fabrication through the gates into the precincts of the holy capital. It may here not be out of place to observe that, considering the state of the Roman sewerage and the filthiness of the city in general, and the foul smells that abound in almost all parts, it is a most unaccountable fact how so disproportionate a dread should have arisen of carbonic gas. Every Englishman who has visited Rome can testify that Roman noses cannot be tender; indeed, their callousness in this respect calls to mind the philosophical remarks on the subject in 'Humphrey Clinker.' The Roman authorities, after much shaking of heads and great consideration, allotted a portion of the most classical of ancient Rome for the construction of modern gas works. The interior of the Circus Maximus is the chosen spot. The antiquarian will grumble at this desecration of classical ground; if he has, however, had to grope his way home through dark alleys and dingy streets, he will bless the change, even though it spoil the remains of Rome's grand circus. The works are progressing briskly. Mr. Shepherd, the contracting engineer, has returned from England, and before the end of a twelvemonth all is to be completed. The inhabitants of the neighbouring convents near the Palatine have had their curiosity excited by these busy doings; brown monks take snuff over the newly dug tanks, and shake their old heads in wonder at the changes in progress. It was expected that some remains would have been found in making the excavations for the gasometers; nothing has, however, been met with, which proves that the earth, which is wholly composed of vegetable matter, must have been brought there at a later period, or have by degrees filled up the circus, being gradually driven down from the Palatine and Aventine hills, between which it is situated."

Odense (Denmark).—An English company has been formed for establishing gas works in this town. The capital is fixed at £18,000, in 18,000 £1 shares, 4500 of which have been subscribed for by Mr. Regnar Westenholz, Mr. John Addis, Mr. John Duddin Brown, Mr. John Johnson, and Mr. Thomas Young.

South Essex Gas Company.—Mr. J. S. Winterflood, of No. 4, Cottage-grove West, Walworth, and Mr. W. O. Tucker, of Sun-chambers, Threadneedle-street, have given the requisite notices of withdrawal from the provisional direction of this company.

The Great Central Gas Company *v.* Tallis.—This long-pending case is expected to be tried in the Exchequer Court, Guildhall, in the course of the ensuing week.

Oporto.—The contract for the lighting of this city with gas has been taken by Messrs. José Izidoro Guedes and Co., of Lisbon.

The Iron Trade.—The excitement of the last few weeks continues unabated, and contracts are now everywhere being refused, unless at a further advance of £2 per ton. How much of the present demand is of a speculative character, and what prospect there may be of a sustained export trade, seem to be matters of little consideration among the clamorous. That there is, and will be for some time to come, an accumulation of demand beyond the powers of production in our district, is taken as an undisputed fact. The proprietors of many large works have already been compelled materially to reduce their make, though under an unusual press of orders, from inability to obtain materials, particularly coals. During the last few years of unremunerative trade, not only have many inferior workings of mines been abandoned, but the usual preparations and provisions for future supplies have, to a great degree, been neglected; and, in addition to the scarcity that has thus naturally ensued under so large an increase of consumption, unfortunately the late unpropitious weather has most materially impeded mining operations of every description. In several localities it has put a partial stop to them, by laying large tracts under water, and a considerable time must elapse before their previous amount of produce can be recovered. Both ironstone and coals are therefore realising unwarrantably high figures, and a further advance has been given, unasked, to the miners and colliers, making upon the whole 1s. per day to the latter, and 6d. to the former.—*Aris's Birmingham Gazette.*

Substitute for Artificial Illumination.—Every improvement in the means of obtaining light, an element so important in the every-day transactions of life, is highly worthy of public support; and the possibility of superseding gas during the day in those dark counting-houses, underground warehouses, and many manufacturing establishments with which our metropolis and other largely populated places abound, is certainly a subject of the highest moment, not only as regards economy, but in a sanitary point of view. Mr. Chappuis, of St. Mary-axe, is now introducing a plan for obtaining from the reflected rays of the sun a very large increase of light, in places quite insufficiently illuminated from the windows, unassisted by artificial means. It is simple, but exceedingly effective, consisting of a sheet of silver-plated copper or other metal of proper size, corrugated, not in regular ridges and furrows, but in linear and cross waves, forming an uneven surface of eminences and depressions. This is enclosed in a neat frame, and being placed either outside the window, or in any other convenient position, all the light received on its surface may be reflected in any direction, and with extraordinary effect. We have no doubt "the day-light reflectors" (as the manufacturer calls them) will come into very general use, and give every satisfaction. We understand Mr. Chappuis is now prepared to supply them to any extent on the receipt of orders, and on terms within the reach of all classes.

Exportations of English Coals to France.—The quantity of coal exported in 1851 from England and Wales to France far exceeds any previous year, amounting to upwards of 250,000 tons. The consumption of coal as a fuel in France is rapidly on the increase; but, although there are extensive coal basins in the Loire, St. Etienne, Rive de Gier, D'Anzin, Alais, and other districts, still the preference is always given to our Newcastle and Wallsend coals, although much higher in price, in consequence of the existing import duties, which, however, by the treaty of commerce just concluded between England and France, and which is to come into operation next month, will be materially reduced, so that the exportations henceforth will be very considerable. Not only is the preference given by the inhabitants to English coal, but the Government contracts, either for the use of their steam mail-packets at Calais, Marseilles, the Mediterranean, and the Levant, are chiefly in favour of Wallsend and Welsh coals, as also for their steam navy, much to the jealousy of the large coal proprietors of the Loire, &c.; and, as the French Government is considerably augmenting its steam forces, the demand will increase in proportion. At Dunkerque, Calais, Boulogne, Dieppe, Havre, Rouen, Paris, &c., there have been established, within the last few years, very large depôts of English coal; and, though the French and Belgium coals are lower in price from one-third to one-half, still the former has the saving.

Coals in the Port of London.—By a parliamentary return obtained by Mr. Hume, the quantity of coals imported into the port of London for the last seven years is shown. In 1845, the seaborne coals imported were 3,392,512 tons. The duty was 1s. 1d. per ton, and the net amount realised £177,540. 3s. 1d. The coals brought landwise in the same year were 68,688 tons, and the net duty £3640. 11s. 10½d. In 1851 the seaborne coals imported numbered 3,246,287 tons, and the duty £165,461. 1s. 3d. The coals brought landwise in the same year reached 224,339 tons, and the gross duty was £12,151. 5s. 5½d., and the net duty £12,071. 5s. 5½d., being an increase of more than one-half on the preceding year. By a note it is stated that, in addition to the above duties, amounting in all to 1s. 1d. per ton, being payable to her Majesty's Commissioners of Parks, &c., and the Corporation of London, there are certain tonnage dues payable at the Custom-house upon vessels laden with coals arriving at the port of London, but there were no means of ascertaining the amount of such dues separate from the amount paid on vessels laden with other articles of merchandise.

Coal Duties.—From a parliamentary return procured by Sir B. Hall, it appears that the duty of 4d. per ton payable to the Corporation of the City of London on coals brought into the port of London in 1836 was £44,041. 4s. 8d., and last year the duty was £54,104. 15s. 8d. There were charges on the collection, draw back on coals exported, and retiring allowances to coalmeters. The deductions in 1851 were £10,832. 14s. 6d. The duty of 4d. per ton on coals being the property of the Corporation of London, the balance, after the payments mentioned and the charge of £20,000 per annum set apart for street improvements, is carried to the general account of the Corporation, and applied by them in aid of municipal government, administration of justice at the Central Criminal Court, maintenance of prison, magistracy, police, coroner, and other purposes in respect of which the funds of the Corporation are chargeable.

MINUTES OF EVIDENCE ON THE LIGHTING OF THE HOUSE OF COMMONS.

(*Continued from p.* 425.)

MARCH 26, 1852.

D. B. Reid, Esq., M.D., further examined by the CHAIRMAN.

345. You will doubtless have remarked that several witnesses have stated that, besides suffering from the effect of the gas lights, they have been much incommoded by the inequality of the temperature, and by strong currents of air; will the remedies which you have suggested in your report abate those evils, or have you any others to suggest?—Most certainly the remedies will abate those evils; and I think it is admitted, at least I entertain the opinion myself, from the observations I have made, that they are abated. But, till the system of ventilation can be introduced in full, we shall not have a diminution of those currents to the extent which is desirable, except we send in more air through the House than we should wish to do.

346. What do you mean by the system of ventilation being introduced in full?—The ventilation is only partially in operation at present; I consider that it can be put effectively in operation at present, if not counteracted by other causes; but the entire supplies of air from the roof are arrested by the intense heat from the burners. I have the means of giving a supply to the galleries from above; and, if that supply be given from above, I can force in air there to such an extent as, without altering a single arrangement below for the members individually, would assist me in giving a plenum movement, so that we should have much less draught at the doors.

347. I understand you to say that the principal obstacle at present to the satisfactory ventilation of the House by your means is the existence of those burners?—Yes, in their present condition.

348. Is that which you have just mentioned, in reference to the burners, an opinion which you have always held, and have you also published it?—I have not only held it, but published it in many different ways; and, in the book in my hand, I have given very specific illustrations connected with it. In page 13 of "Illustrations of Ventilation," published in 1844, which was addressed to members of both Houses, I showed a burner, and a large pipe from it taking away the products of combustion, so as not to permit a particle of vapour to condense. Below, to the very source of the light itself, you see a double casing, the object of one casing passing inwards being to supply cold air. In this case the plan illustration was not made for the purpose of lighting alone, but also to take away the heat from a wooden beam in the vicinity.

349. Mr. HOPE.] Is it the case that, independently of the burners themselves, the iron work connected with the lamps gets exceedingly heated?—So hot that you cannot touch it; therefore, though not luminous, it is a mass of heated matter.

350. And there is a very large bulk of that iron work connected with those lamps which is brought to this intensely hot temperature?—I should say about five or six hundred weight. The total weight of the largest lamps, lamp and tube, has been said to be seven hundred weight.

351. Every burner has a separate tube, has not it?—I allude to the central tube proceeding from the congeries below.

352. Each burner, according to Professor Faraday's system of burners, has a separate chimney, has not it?—It has. There is the gas tube and the other tube.

353. And every one of those tubes becomes intensely hot in consequence of the circulation of the fumes of the heated gas through it?—Yes.

354. Every one of the burners has three glasses, has not it?—Yes.

355. So that the light which comes from those burners is very small in proportion to the heat which is produced by them?—It is diminished by the glass considerably.

356. Therefore we may conclude that the light which the House obtains from those lamps is nothing in proportion to the inconvenience which is produced by the heat?—That is my opinion, particularly considering the quality of the gas which is used.

357. Sir D. NORREYS.] In fact, in driving down fresh currents of air from above, instead of driving cool pure air down, you would be driving down a mass of air heated and destroyed by the radiation of the lamps?—I should.

358. Is not the power of driving down a current of fresh air from above at times an almost necessary incident to your system of ventilation?—It has always been an almost necessary incident to the system as applied to this House. It is not necessary where I have certain facilities of supply below, but, from the limited nature of the supply below, I found it essential to combine with it a certain portion of descent from above.

359. The quality of the air has been complained of; it is said to be dry, as if it contained dust, so as to create an irritation in the throat; may not that, to a certain extent, proceed from the current being always upwards, and the floorcloth not being sufficiently cleansed from the dirt contracted during the week?—I cannot imagine that to be the case to any very objectionable extent.

360. May not that dry and dusty effect also be produced from your cold-air chambers below not being in that perfect state in which you would wish them to be?—Every precaution is taken, and I see no trace of dust there, except that which may come from the floor.

361. Have you examined at the latter part of the evening the pendants in front of the gallery, and seen that they are covered with a thick coating of the finest dust, which appears to have been carried up during the course of the evening?—I am not aware of that fact; at the same time I have always stated that the difficulties which a ventilator has to labour under are between the Scylla and Charybdis of the dust below and the products of combustion above. If there could be accorded to me a sufficient ingress of air from a perpindicular surface, I should never take any portion from a flat horizontal surface which the foot touches; but, when I am driven to take that or to have nothing, then I must act under the restrictions imposed upon me. I am exceedingly anxious to make these points about the draughts, and about the ceiling, and the moisture, as specific as it is possible to do; and, if the committee will allow me, I will say a word or two upon them. In respect to moisture, we have had observations made daily for the last 15 years, and recorded every hour. There is a large bundle of papers on the subject which honourable members can see if they choose, and my experience derived from that source is that when there is a difference of 5° between the dry thermometer and the wet bulb thermometer next to it, then I have the least number of complaints. But the difference between honourable members in respect to the amount of moisture which they like is as great as the difference in respect to their preference for a particular temperature. The difference also before and after taking refreshment is very great, as I think will naturally be obvious; so that, if a body of 500 members shall be detained late during a debate, they will generally prefer before dinner a moist atmosphere, but after it a dry atmosphere; that is an invariable fact; a dry atmosphere promotes evaporation, but a moist one prevents it; my impression is that we have the power to give anything, from the driest atmosphere that the air affords, to an atmosphere saturated by steam and evaporation. I do not think there is anything so perfectly under our control as moisture, in respect to adding it when the air is dry. It is more difficult to take away moisture when it exists in excess, though we can add moisture when the air is dry to any amount; but we never can hit the individual tastes of every one, and, of course, we never attempt it, but we try to work to an average. The next point to which I wish to refer is the currents of air at the door; if the committee will allow me to suppose this room to be the House of Commons, and, further, that it is desired to give air in such a quantity that it shall leak outwards at every door, and, therefore, that practically there shall be no current inwards, unless the violent slamming of the door, or a violent north, south, or east wind is permitted by the opening of the door to enter. That, of course, I cannot control. Supposing I have arranged this, and that it is all working to my satisfaction, then to a certain extent I am compelled, in order to produce that plenum impulse, to send in such a quantity of air that the ordinary apertures will not discharge it all. If the ordinary apertures did discharge all the air, there would be none to leak out at the doors. I am obliged to send in such a quantity of air that the ordinary ventilating discharges will not let it all out as the valves are set; if the ordinary ventilating discharge did let it all out, then there would be no superfluity to leak out at the doors. With a perfectly homogeneous atmosphere, a little excess striking upon the ceiling generally throughout the room, and recoiling a little, does no great harm; but if that ceiling be charged to a high degree with excessively hot air perhaps 6°, 8°, or 10°, or immediately over the lamps 20° or 30° above the temperature of the rest of the atmosphere, the greater the recoil downwards by the sides of the galleries, the less facility have I to work my plenum movement so as to produce a leakage out of the doors, unless I run the risk of bringing down some of this superior warm air to the level of the leaking doors. If there were no obstructing cause from the excessive heat at the ceiling, I could at all times send in air of a particular temperature, that would descend, so far as the supply of the galleries goes, while the members would have that continuous movement upon the floor which we are all anxious to obtain.

467. CHAIRMAN.] Have you discovered in the place where the gas meters are situated any considerable annoyances to the ventilation of the House of Commons?—I have; I have never been in the room where the gas meters are without smelling the gas; I should not object to that if it were confined within the room, but I do think that a flue must be arranged, so long as those meters are there, to take off the amount of leakage which occurs. On one occasion, on a Sunday, there was an alarm that the gas had escaped greatly; the parties sent to me; we had all the lamps extinguished, and I went round with the foreman of the clerk of the works, and we had reason to believe that the gas had been escaping from the Saturday night till the Sunday afternoon; nor have we any direct means of controlling it, or of knowing when the gas leaks and when it does not, for there are some of the tubes which are actually plastered into the wall, and totally inaccessible.

468. Had you seen that gas chamber and estimated all those inconveniences when you made this report?—Certainly; at the same time, in making the report, I looked to having the control of all the materials in the shape of fixtures there; I did not look to have the control of any individual burners, but certainly I did with respect to all the large apparatus, such as the gas meters and the fixed mains.

MARCH 29, 1852.

D. B. Reid, Esq., M.D., further examined by the CHAIRMAN.

582. The committee understand you to say that, for the purpose of putting your plan into perfect operation, you desire to have the power of introducing both a downward and an upward movement?—Certainly, at various times.

583. At present you are prevented doing that by the state of the lighting of the House?—And the leakage from the gas. I ought also to state that though I am quite ready, with the assistance of manual labour, to put the apparatus into full operation, yet there are many of the arrangements and details which are not completed, and there are many places where the temporary arrangements at present in force will be superseded.

584. Do you consider the present state of the lighting an absolute impediment to your putting in operation the downward movement?—Certainly, with the heat of the present lamps in the House. I had only an opportunity of seeing the lamps in operation once, and that but for a limited time, previously to the opening of the House. The lamps out of the House are, I believe, not thoroughly completed at this moment. At all events, there were no less than 24 which had to be put out on Friday, black smoke having been deposited, more or ess, on each.

592. Is the lighting now entirely under your orders?—It has been

put under my direction, but I never asked to have the lighting of those lamps put under my direction, though I have patiently attended to them in the best manner I could since they have been put under my direction. Till Friday night I have always endeavoured to give every possible facility for the lamps in the corridor being perfected; but when, after repeated intimations, I find leakages of gas every where, and the glasses of 24 lamps blackened at one time to a greater or less extent, as I pointed out to Lord Seymour and Lord John Manners, and other members, I have given instructions that those corridor lamps be not lighted for the future, until I shall be able to see that there can be some guarantee that there shall be no leakage of gas, and no blackening of chimneys, such as was observed on Friday night. The lamps, no doubt, sometimes are blackened in consequence of an excess of gas, there being a deficiency of air to ensure its combustion. When an excess of gas occurs, from whatever cause it may have arisen, then that charcoal which cannot get oxygen to consume it is deposited upon the glass. On Friday night some were blackened throughout, others partially.

593. Sir D. Norreys.] Is that the fault of the gasfitter, or of the arrangements of the lamp itself?—It may at times be dependent upon the carelessness of the attendants. It may be dependent upon the impossibility of getting sufficient light in those lamps without pushing the supply of gas too far, so that, in giving a sufficiency of light, they may approach too near the boundary of the consuming power.

594. Is the defect one which can easily be remedied?—I cannot say that it can be easily remedied, in connection with the supply of a sufficiency of light. There is no doubt a greater power of draught could be put on, but whether the burners will admit of the amount of gas being consumed which is requisite to give a sufficient illumination, may be another question.

595. Chairman.] The committee understand your objection to the present lamps to be, that the tubes, under any circumstances, will become so hot as to interfere materially with the ventilation of the House?—That is the case in the House. In the corridors the objection is less, but in summer it will prove very inconvenient.

596. Sir D. Norreys.] You have stated that, by your system of ventilation, you are able to produce an upward current and a downward current; could you so manage that ventilation that there should be a certain stratum of pure air extending to a given depth below the ceiling, which should, by its own gravity, continually descend and mix with the lower and warmer stratum of air, thereby continually reviving it by its coolness, yet without draught?—I could do that in a house constructed for the purpose.

597. In the present House of Commons, as it is constructed, could you effect that?—With so much difficulty to the whole House, that I should not recommend it to be attempted; but I would constantly do it in particular states of the atmosphere and particular states of the attendance at the House, so far as to have a supply below for the members, while I would retain a sufficient supply for the galleries from the ceiling. Thus we should have a certain amount of air descending from the ceiling and supplying the galleries, while with our instrument below we give that which would be sufficient for the body of the House.

598. You could so manage the state of the atmosphere in the House that there should be a plenum, as you have termed it; that is to say, that the air should flow out from the House through the doors of the galleries above, and should flow from the lobbies into the House below?—That might be managed, but it would be very difficult to prevent any plenum movement given in the House above not also acting on the House below. It is, however, a curious fact, that in innumerable cases we have a plenum in the upper gallery when there is a vacuum below in the body of the House; but when I have the power of giving a plenum both above and below, then I can secure, with much less current inside among the members, a plenum every where. At present, the extent to which external currents, entering by doors or windows, interfere with the movements dependent solely on the ventilating apparatus, are the principal cause of the apparently anomalous movements under consideration.

599. Do not you propose to throw light into the House by the removal of the painted glass, by placing lights behind, and reflecting that light into the House?—I do.

600. Do you consider that a plain flat reflector would have the power to project a sufficient body of light into the House to be effective across the House, or must not a curved form be given to the reflector which would be used?—I do consider that it would be possible; at the same time it would greatly facilitate the arrangements to have a certain additional power from the ceiling.

601. Have you ever carried into practical operation your present proposition of lighting a large room by reflected light?—I have repeatedly done it by experiments on a small scale, and to a certain extent in the House, but I have never had an opportunity of doing it completely in a large room such as the House of Commons, where the light was not seen.

602. Can you give the committee any idea of the proportion of light which would be required, taking a system of reflected light and of direct light, taking into consideration the size of the room you are about to illuminate?—I find a difficulty in answering that question, unless I am allowed glass of the finest possible character; with certain thin glass for the interior glazing of the windows, I consider I have produced that effect, with about double the quantity of light, when the burner was not seen; where you allow the light to be seen, a less quantity may suffice.

603. Do you wish the committee to infer that simply doubling the amount of light would be sufficient to illuminate a room from a flat reflecting surface as would be required if the light were to operate directly?—Not exactly so; I could only determine the precise quantity by experiments.

604. Have you not tried the experiment?—I have not tried it in every possible detail; but I find that the thickness of the glass through which the light permeates is a very important element in the consideration of the question.

605. In order to obtain an amount of illumination from a reflected surface equal to that obtained by a direct radiation from a single point, would not it be necessary that there should be such an amount of light on that reflected surface, that the reflected surface itself would become nearly as painful to the eye as a single point of light?—I cannot imagine that to be the case, because we all know that when we look at a visible light the glare is sometimes extremely painful, whereas, if you look at a surface illumtnated by a light much more powerful, but which may present a thousand times larger surface, perhaps, you may have an equal body of light without pain to the eye; the intensity being less, though the absolute quantity may be greater. It is exactly the same as you find to be the case with respect to water. I may put my hand into boiling water and be scalded. If I have only a pound of boiling water, I have much less heat in that pound of boiling water than I would have in ten pounds of warm water at a low temperature, into which, however, I might put my hand without injury.

610. Mr. Fitzroy.] Is the committee to understand that the only existing obstacle to your introduction of the downward current is the state of the lamps in the House?—It is; we have used the downward current once or twice to a limited extent; but we were instantly obliged to shut it up from the intensity of the temperature above the lamps.

611. How long do you imagine it would take to arrange the system of lighting the House in the manner you propose?—I do not think I could complete it from outside under the time mentioned, probably about five weeks altogether; we could begin at once, and execute the works in a fortnight, if we had two or three weeks' previous preparation; but it would be quite easy to carry the work on during the sitting of the House.

612. Supposing the system of lighting to be so altered as to enable you to introduce the downward current, do you think that you should very much improve the ventilation of the House by doing so?—Certainly; a limited amount of that downward current would be invaluable.

613. Brought as low as the body of the House, or only to the galleries?—It would be principally brought to the galleries, but part would at times extend below.

614. Mr. Greene.] Do you mean that the current of foul air would be in the centre of the ceiling, the additional fresh air being introduced at the sides?—That would be the case; at present the entire ceiling is divided into several great compartments, all of which are accessible by different doors. Some of those compartments could be connected with the shaft; those connected with the shaft would draw out the vitiated air, and they would always draw out the hottest and most vitiated.

615. Mr. Fitzroy.] Would the plan of lighting which you propose at the ceiling present any difficulties to the transmission of the downward current?—Certainly, in that particular spot it would. The fresh supply of air must then be taken on either side of the central panels; it would not be impracticable, however, to have the descending current in the centre, even though the products of combustion ascended from the lights; by special arrangements that mode could be adopted.

616. Your proposal is to diffuse light all over the ceiling?—Over the central portion of the ceiling, and along the outside of the windows.

617. Chairman.] Do you propose the substitution of glass in some shape for the present panels?—Not of glass, unless I were compelled to adopt it.

618. What would you propose to substitute?—Plaster work, which might be tinted to any extent.

619. How would the light pass through the plaster work?—It would not pass through it, but from it. Supposing this sheet of paper, which I am holding in a horizontal position, to be the panel of the ceiling, the burner would be beneath it, and, if below that there were a plaster ornament such as I should recommend, you would not see the burner, but only so much of the light as was permitted to pass through, and which would be reflected from the panel above.

623. Sir D. Norreys.] Are the committee to understand, in reference to the light which is to be produced at the ceiling, that it is to be entirely a reflected light?—As nearly as practicable.

624. Do you mean as nearly as consistent with the not producing a strong shadow from the light itself?—Certainly; but I would add more than that; I desire as much as possible to have only a reflected light.

625. Then you would conceal the light itself, as far as possible, by some ornament below?—Yes, but it might so happen that in the working out of the details of that ornament, some small portion of the light, perhaps of the size of a candle or otherwise, might be conveniently and advantageously introduced.

626. In order to avoid the shadow?—In order to avoid the shadow, and also to give a larger body of light there; therefore, if I reduced the visible light, either altogether or to such a degree that it became totally unobjectionable, I should then attain the desired object.

627. But still the same body of heat which you complain of in the present system of lighting would exist near the ceiling in your proposed plan, and would to that extent interfere with your ventilation, would not it?—I believe I have the power, by means of the materials used, of diminishing the intensity of the heat there; the amount of heat would be far less than in the case with the lamps used at present, because we would have so much at the sides, and also a better quality of gas.

628. Would not you, in order to get a reflected light of sufficient intensity to illumine every part of the House, be obliged to use very large burners, and to have at least one, if not two, under every division of the panels in the present ceiling?—I should certainly be obliged to use burners that would give a considerable power of lighting.

629. Would not you be obliged to multiply your burners to an almost indefinite extent, in order to be able to obtain from a reflected

surface the same amount of light as you now obtain directly from the gas lamps?—Not to an indefinite extent; because if I have burners which are not visible from below, or which are nearly invisible from below, and if the heat from them does not emanate from a focal point in its passage to the House, but is diffused over a broad surface, the intense effect which it produces upon the brow at any given place will be proportionately reduced.

630. The radiation will be less, but still must not a greater body of fire exist near the ceiling to disturb your ventilation than exists at the present time?—I do not consider that that will be the case, because those lamps will be all placed either on the line of the ceiling or near it, so that the intensity of the heat from them will be at once removed.

631. CHAIRMAN.] Will those lights which you are now speaking of be managed by persons outside the House, or must people come inside the House for the purpose?—Entirely outside the House, beyond the visible window, or above the House, beyond the visible panel.

632. Sir D. NORREYS.] Would there be any possibility of your obtaining precise information within a short time as to what proportion of light would be obtained for the purpose of illumination from a single point by direct action, as compared with the amount of reflected light which would be obtained from the plastered surface which you speak of?—Yes, certainly. Such an experiment, however, must be tried in relation to the House, in order to tell accurately upon the House, where the colours of oak, and green, and black, so much predominate. We require an amount of illumination far beyond what would be required in a mere experimental apartment.

633. CHAIRMAN.] Do you propose that the ornament you speak of shall prevent the light being seen from the Members' Gallery, or the Strangers' Gallery?—I propose to have it entirely invisible, if I can get such a light. I have lighted a public building temporarily where the light itself was invisible, and where you only saw the soft mild whiteness of an illuminated plaster surface.

634. What building do you refer to?—I refer to a court at Liverpool. I have not, however, had an opportunity of permanently carrying it out.

639. Are the committee to understand that that system of lighting the courts at Liverpool, to which you referred, has been continued or not?—It was only an experimental illustration.

640. The committee are to understand that it has not been continued?—I never tried any system further than to show to the committee there the effect of certain arrangements which I suggested.

641. Were those arrangements approved of?—There has been no permanent lighting apparatus fitted up at present; they are only temporarily lighted now, so that whether it may be approved of finally I cannot say.

APRIL 2, 1852.

Neil Arnott, Esq., M.D., examined.

1290. Mr. GREENE.] Have you seen the lighting of the House of Commons?—I have.

1291. Will you give us your opinion upon that mode of lighting?—I passed into the gallery yesterday when the lamps were burning, and I found the heat from them very oppressive there. These lamps when lighted up in the House, already warm enough, become like a blazing fire lighted in a summer apartment. In this committee-room, lately, an honourable member reported some experiments which he had made on the difference of temperature at different distances from the lamps in the upper part of the House, according perfectly with what I observed last night. Light from above is the most natural light to us; for the sun sheds his light from above; but where light is united with much heat, as in the sunbeam or in the illumination of the mass of gas lamps in the House of Commons, a screen becomes necessary. In nature, the hair of the head, even of the naked savage, defends him from the sun; among civilised people we see the turban answering this purpose: the hat, the umbrella, the parasol, and so forth; frequently, persons exposed to the hot sun with the head uncovered are affected with headache, *coup de soleil*, palsy, &c.; the lower animals seek the shade of trees. Now, the intense heat upon the heads of members sitting in the gallery of the House of Commons, is oppressive and not without danger; it seems essential, therefore, if the House is to be lighted chiefly from the top, which probably is the best mode, that there should be some screen to give protection. It happens conveniently that the substance of glass, although allowing the heat of the sun to pass with the light (as proved by the action of a burning glass), arrests the radiant heat of ordinary combustion; this is familiar to us in the instance of a glass screen standing before a drawing-room fire; a person sits on the distant side of the screen and feels nothing of the radiant heat of the fire; the glass itself becomes heated just as a sheet of iron would be, and then, as a new centre, diffuses the heat which falls upon it in all directions, instead of letting it pass on to the person screened. Lamp-glasses themselves, being near the flame, may become almost red hot, but a sheet of glass at a greater distance remains comparatively cool. If the lamps in the House of Commons were raised so near the ceiling as that a floor of glass could be placed beneath them—separating them in fact from the House altogether, and causing them to be supplied with air from above—nearly the whole light of the lamps would enter the House, with very little of the heat. It had been proposed for the late House of Commons, by Dr. Reid, to place the lamps outside altogether, above the ceiling and on the outside of the windows.

1292. Sir D. NORREYS.] I understand you to recommend a sheet of glass in the place of the present ceiling, and that the lights should be suspended above it?—I say, that if the lamps were placed above the ceiling, or above a floor of glass near the ceiling, over which floor a current of cool air could pass, carrying away much of the heat, the light would be made to descend with scarcely any of the heat. I may here observe, that pure hydrogen gas, in burning, gives intense heat with very little light, while coal gas, and, still more, oil gas, consisting of hydrogen with carbon dissolved in it, gives, with little more heat, increased light in proportion to the quantity of carbon present. Gas with little carbon is more cheaply produced than richer gas; much of the gas used over London is of inferior quality, and I believe that the gas now used in this House is of the ordinary kind.

1293. You would not recommend a committee of this kind to trouble themselves with the question of the quality of the gas; any recommendations which you would make would have reference to the possibility of the very worst gas being employed?—They would. These lamps, now in the House of Commons, of Mr. Faraday, are, like everything which comes from him, ingenious and beautiful; but, if the lights are to be placed above the ceiling, a simpler form of lamp, or gas jets without chimneys, would probably be found more convenient.

1299. In case of the application of the lights above the ceiling as you have stated, would you recommend the adoption of ground glass beneath them, so as to soften and modify the intensity of the light?—That might be done or not; I should not think it very essential, because my impression is that, from the lights being placed so high, persons would no more need to look at them than at the meridian sun; so that whether the light were passing through ground glass, which is a considerable impediment, or descending through clear glass, they would little heed the difference.

1300. Mr. LOCKE.] But, if the intensity were found to be considerable, it might be diminished by the introduction of ground glass?—Yes.

1301. Sir D. NORREYS.] The system which you propose is a system of direct action, the light being assisted by reflectors, and not a system of light only by reflectors?—Yes; I would not waste any of the direct light without a necessity.

1302. You would combine radiation and reflection?—Yes; but I am not prepared to say whether sufficient light might not be got by reflection alone, from the ceiling and walls strongly illuminated. It is believed that concentrated light coming from above does not show the expression of features to such advantage as when there is also considerable reflection from surrounding walls.

1303. Viscount PALMERSTON.] Does not ground glass refract the rays of light rather unequally and disagreeably?—Some persons dislike to look upon any extended very luminous surface, such as the ground glass globe of a lamp, or a white row of houses in the sun, or white sands; but the refractive and other effects are uniform over the whole surface of ground glass.

1304. Sir D. NORREYS.] In respect of the side lights, when you stated that lights could be placed where the painted windows are now, would you adopt a direct light, or would you adopt a reflected light, or a direct light assisted by reflection?—I think the last named, passing through ground glass, or reflection alone from intensely white surfaces.

1305. Mr. LOCKE.] Have you at all considered the question of lighting the House by means of wax?—Yes; a smaller quantity of light might be made to answer the purpose, by placing the wax candles near to the persons; but the whole heat and impure air of the combustion would spread in the atmosphere of the House.

1306. What would be the difference in the quantity?—I think the light might be less by a half.

1307. Then, if the lighting by wax could be introduced with the same simplicity, in your judgment it would be a better light than gas?—It would answer well if the heat and carbonic acid could be at once removed.

1308. It would be cooler?—It would be cooler than equal lighting by common gas, of which the heat were allowed to remain; but if the candles were placed high up, and were therefore more in number, there would be no advantage. I was at the Hotel de Ville, in Paris, last year, when it was brilliantly lighted up by many thousands of wax candles placed high; but the excessive heat caused much dropping of the wax on the company.

1309. Do you think it would be possible to introduce any system of wax lighting which should get rid of the annoyance arising from the excessive heat of the gas, and with any degree of efficiency?—I should think it inferior, for several reasons, to the gas lighting, well managed.

1310. And you think that the gas lighting might be so well managed as to render having recourse to wax unnecessary?—Yes, I do.

1311. Then you think the system of gas lighting for the House, with a false glass roof, and the lights above it, would be sufficient for lighting the House of Commons?—Yes.

1312. If it were not sufficient, you think, at all events, it might be made positively sufficient by the introduction of lights at the side, where the present coloured windows are?—I have no doubt of it.

1313. With the introduction of such means, would your system of ventilation, upon which you have been giving evidence, be at all inapplicable?—The two would readily harmonise.

1314. And the introduction of an artificial glass roof would not interfere with any mode of ventilation which might be adopted?—Not in any degree.

1315. Viscount PALMERSTON.] Would not wax lighting, at the same height as the gas lighting which you propose, be liable to this disadvantage: that the wax light would not radiate the light downwards in the same way as the gas light would in the shape of lamps?—Yes; the body of a candle intercepts more of the downward light produced than the solid part of a good gas burner does.

1316. Is not the surface of the frame of the gas burner of larger diameter compared with the solid frame of the candle, taking the diameter of the candle itself?—I think the simpler forms of gas burner throw less shade downward than candles; but in the lamps now in the House I think the proportion of the solid frame below is greater than that of the solid candle.

1317. Mr. LOCKE.] Supposing that objection to hold good, as the noble lord has put it, I understand you to admit that one of the advantages of using wax would be, to permit you to use the chandeliers at a lower elevation than you could use gas, on account of there not being so much heat given out?—Wax may be used at lower

elevation or nearer the persons assembled, because of the greater subdivision of the sources of light and heat; but the whole heat produced in giving the same amount of light would be exactly the same for wax candles and for good gas.

1318. Sir D. Norreys.] Suppose that, in the present House of Commons, by direct light, you required 40 gas burners to give a certain amount of illumination, how many similar burners do you suppose you would require, if they were placed above the ceiling, with ground glass of the most approved dimensions for the purpose, interposed between the House and the lights?—I am not prepared to speak with precision upon that point; I have not made the experiment.

1319. Could you, from your experience, state whether twice or three times the amount of light would be required, or more?—It certainly would not exceed twice.

1320. Mr. Drummond.] For the inflammable illuminating matter, what you would prefer would be, a gas containing more carbon?—Yes; and I may mention that it is possible to convert the common gas into good gas, by letting a portion of naphtha vapour mingle with it, in a suitable vessel connected with the gas pipe.

1321. Mr. Greene.] If you had the finest description of gas in the present gas lamps of the House of Commons, would there be any great inconvenience felt?—The heat would still be excessive: I believe there can be no comfort to persons sitting in the galleries, while that blazing fire, as it may be called, unscreened, occupies nearly the whole of the ceiling.

1322. Not even using the very best description of gas which you could procure?—No.

April 5, 1852.

Sir *Charles Barry*, R.A., examined by Mr. Bankes.

1479. Are you perfectly satisfied with the mode which you have adopted for lighting the House?—I cannot say that I am satisfied; the mode adopted for lighting the House is too complicated, and is attended with many inconveniences; I had, however, no alternative but that of adopting the mode which I employed, because the conditions upon which the lighting of the House was placed were, that the lights should not interfere with the ventilation of the House, under the direction of Dr. Reid; nor should the space immediately above the ceiling, appropriated to his exclusive use, be occupied by any portion of the lighting apparatus; it was, therefore, necessary that the products of combustion, arising from the lights themselves, should have separate ventilation, totally independent of the ventilation of the House.

1494. What is your opinion of the suggestion made by Dr. Reid in his report as to a new mode of lighting the House of Commons?—As far as I can understand the suggestions of Dr. Reid, which appear to be experimental, I cannot say that I have much confidence in them.

1495. Have you any particular observations to make with regard to those suggestions?—Only that I think it would be necessary, before any alteration is made, that those suggestions should be more accurately explained in detail, otherwise they might lead to a very extensive alterations of the building.

1496. Chairman.] You contrived the system of lighting which the House found when it took possession of the House at the commencement of this session, did you not?—I did.

1497. And you state that it is not satisfactory. What means should you propose, were it placed under your superintendence, to improve it?—I should propose to get the light through the ceiling in certain portions, avoid the complication of chandeliers, and thereby avoid the necessity of entering the House for the purpose of lighting; there are various modes which might be suggested; some have been adopted of late years in Liverpool with very great success; the light which is called the sun light or the rose light, now used for the purpose of lighting public rooms in Liverpool; that light is in the ceiling, and wholly manageable from the ceiling.

1498. Could you draw out a paper upon that subject, and put it in, so as to explain it more fully to the committee?—I should be happy to do so. I may, however, take this opportunity of stating that I have not witnessed this mode of lighting in Liverpool; but it is very probable that before the next meeting of the committee, after the holidays, I may take that opportunity, and in that case I should be happy to afford any information that my visit to Liverpool will enable me to give.

1499. It is under your superintendence that the House of Lords is lighted, is it not?—It is.

1500. Will you describe how that is lighted?—The lighting of the House of Lords is by means of brackets attached to the piers between the windows, each light being ventilated upon Faraday's principle; that of withdrawing the whole of the products of combustion from the House, without allowing their admixture with the air of the House. The House of Lords is further lighted by means of wax candles, which are placed in candelabra at the throne end as well as at the bar end of the House.

1501. Are those wax candles usually lighted?—They are not.

1502. Then, practically, the lighting of the House of Lords is by means of gas, is it not?—It is ordinarily.

1503. In those brackets which you have just mentioned, upon Faraday's principle, are you aware at all of the state of heat to which the tube gets, which conveys the gas?—Yes; I am quite aware of that, and, as far as that goes, it is an objection to the principle.

1504. Do you consider that the lighing of the House of Lords is more easily managed than the lighting of the House of Commons?—Upon the system adopted there it is certainly more easily managed, because all the lights are fixed lights, and they are within reach of the attendant whose business it is to look to the lighting of that House.

1505. Is there any difference between the structure of the House of Commons and of the House of Lords, and the various circumstances applicable to it, that makes the lighting and ventilation of the one more easy than of the other?—I am not aware of any structural difference that need occasion any difficulty in lighting or ventilating either in the one House or in the other.

1506. Do not you consider that the area of the House of Lords being so much larger, and the attendance so much less numerous, those are elements of facility in the House of Lords which do not exist in the House of Commons?—They may be so, but I think the difficulties are not worth consideration between the one and the other.

1523. Viscount Palmerston.] If I understand you, you propose to improve the mode of lighting the House of Commons by an arrangement, by means of which the radiating light should be above the ceiling?—A little below the ceiling, but very close; within a few inches of it.

1524. You would not propose to remove any part of the ceiling in order to place the light above it?—It would depend upon the extent of light that might be necessary for lighting from the ceiling; upon the principle to which I have adverted it might, perhaps, not be necessary to remove more than a very few panels.

1602. Mr. Locke.] In reference to the lighting, I did not understand you to say that you proposed by your new system of lighting at all to interfere with the roof of the present House of Commons?—With the exception of, perhaps, removing a few only of the panels in the central portion of the ceiling.

1603. That, I suppose, you do not apprehend would make any difference in the hearing properties of the House?—No, I do not conceive that it would.

1604. You spoke of the new system of lighting which had been introduced into a large room at Liverpool; did you mean the large Music-hall there?—That is a novel system, but that is not the system to which I particularly alluded.

1605. What is the system to which your mind is at present directed as being applicable to the lighting of the House of Commons?—I have before stated that I have not seen the system in operation, but I have had sent to me a description of it sufficient to convey to the committee a notion of what it is.

1606. You know enough of lighting to describe it to this committee?—I can give an idea of what it is, if the committee wish to know.

1607. What is the nature of the light to which your mind is directed as being applicable to the lighting of the House of Commons?—The light, which, I believe, is known by the name of the sun-light or the rose-light, is applied to the ceiling within a cone; a certain number of gas lights are so arranged at the bottom of the cone as to shed a very powerful light downwards. The origin of the term "sun-light" or "rose-light," I believe, is owing to the nature and arrangement of the burners, and the form which they give to the light; there are seven or more descending gas pipes in each of these cones, and at the foot of each pipe a circular chamber, from which there are seven or eight jets; these are placed a little below the level at the foot of the cone, and, having nothing whatever to intercept the light between those jets and the chamber below, you have the full benefit of the amount of light given by them, and the intensity of it is very considerable, so much so, that in a room of large dimensions, a church for instance, it is only necessary to employ two of these lights, excepting, perhaps, under the galleries. The light is so intense that the shadows are equally so, and it is necessary under projecting galleries to have the additional aid of bracket lamps. The lighting of the Music-hall is by a different principle altogether, namely, by a series of jets from a pipe which runs round the cornice of the room, communicating with a ventilating flue above it. The light is understood to be most agreeable, and is very equally diffused.

1608. In point of fact, it is one jet of light completely encircling the ceiling of the room?—It is a series of jets very near to each other.

1309. They are almost as close as my hand?—They are within three or four inches, I understand, of each other.

1610. Chairman.] What is there between the eye and the light?—Nothing; but the jets are so well regulated, and so extremely steady, that they do not painfully affect the eye.

1611. Is it some peculiar gas?—The gas used in Liverpool is, I understand, a very superior gas, made from cannel coal.

1612. Mr. Locke.] Those cones of which you spoke would be almost similar to a chandelier if they projected below the ceiling; do you propose them to project below the ceiling?—A few inches only.

1613. Something like the lamp of a railway carriage?—Yes; something upon that principle; in order not to interfere with the operation of a downward current of ventilation, it would, perhaps, be necessary that these cone lights should be enclosed below by glass.

1614. How many, in fact, do you suppose it would require for the lighting of the House of Commons?—From the report made to me of the intensity of light by this mode of lighting, I should say, two.

1615. Do you propose to place them in the centre of the flat part of the ceiling?—Yes.

1616. I understand you that neither that system nor the other would interfere with the principle of ventilation, whatever mode was adopted?—The system of open lights would probably interfere, but to a limited extent only, with the ventilation by the downward current.

1617. Do you think it would interfere with the upward current?—No; certainly not.

1618. You think that, if the system of lighting employed at the Music-hall of Liverpool were adopted, the upward current would be better as a means of ventilation than the downward?—Yes; I consider that it would be better adapted to that mode of ventilation.

1619. Mr. Greene.] Could not you easily cover with glass the whole of those gas lights passing round the cornice of the room?—Yes; if that were done there would, of course, be no inconvenience.

Apirl 20, 1852.

David Boswell Reid, Esq., M.D., called in, and further examined.

1991. Chairman.] Before the committee separated they authorised certain experiments to be made for the improvement of the lighting and ventilation of the House, which were suggested in your report;

have those alterations been made?—They have been, so far as I found practicable within the time, or so far as authority was given to me.

2002. With regard to the lighting, will you state what has been done?—Under the authority of the sub-committee it was arranged that 16 panels, and not 64, should be supplied with lights, and I have accordingly proceeded under this direction. Each light is therefore about four times as strong as it would have been had the whole 64 been employed. Essentially the process adopted was this: a frame of copper was made, and that frame was covered with a cement; Martin's and Keene's cement was employed, as well as plaster of Paris and other materials; and finally 16 such frames, not all copper at first, were arranged in the roof, all being made convex and hollow, so as to distribute the light as much as possible. The light is given immediately under this hollow pyramid, and the light being moveable, capable of being raised or depressed, any degree of intensity of light may be thrown upon the ceiling or upon the floor, according to the elevation or depression of the central light. A single illustration would show this in so marked a manner that, unless the committee wish me, I shall not enter into the detail of the mode in which it is effected; but I consider it one of the great elements of that light that I am enabled thereby, without bringing the light down before the eye, to illuminate to any extent either the floor or the ceiling, or to select a point between the two, which gives the adjustment that may on the whole be considered most desirable.

2003. What is the light that you employ for that purpose?—The light employed is the best cannel-coal gas that we can obtain here. Under each hollow pyramid there is placed a flower, or some other ornament, which is constructed essentially in the following manner:—A series of plates are taken and set at different angles, so as practically to form a cup, within which the light is placed, and which prevent, when properly formed, the naked light from being visible. At the same time, these different plates are set at various angles, so that, though they may be each individually absolutely opaque, the reflection of the light from one to another, with the radiation directly from the light itself upon different portions of this cup, gives it the appearance of a transparent material. By those means I am enabled to attain (if I am wrong, at least it is the result of many observations and experiments) what appears to me to be an object of great practical consequence; namely, that the light shall be as homogeneous and equal as possible, never being twisted through curved glass, which always refracts light that passes through it.

2004. How many of these lights have you placed in the roof of the House?—Sixteen have been placed in the roof of the House; but I need scarcely mention, that to have that light properly developed, and the white matter tinted in unison and harmony with the design, and to have a proper artistic cup, is a matter that would require very great care and study, and the employment of parties who would enter on the requisite minutiæ to develop its nature and effect. All that I have at present attempted has been with such materials as were available to develop the chemical effect.

2005. The light itself, I understand from you, is simply coal gas?—Simply coal gas.

2006. The cannel-coal gas?—It is so; a special main was brought in for the purpose.

2007. Then this light has been applied together with those contrivances which you have already described, there being a certain number of these in each of the 16 squares, which formerly were of other material, and now are transparent?—It is so; the cup may be considered transparent, though the individual portions of which it is composed are opaque.

2008. Has anything else been done with regard to lighting?—Other arrangements have been so far advanced, but nothing completed. I found that to obtain these different instruments within the period required took so large a portion of the time, especially as the recess occurred during the Easter holidays, when it was exceedingly difficult to get workmen in London, that I was compelled to make a selection, and finish one in preference to the other; and, being permitted to do one window outside, I thought I had better push on with that, which would be a complete body of light in itself from the centre, than attempt to complete before the House met what has been partially advanced on the outside.

2009. Have you now stated the entire of what has been done?—Not entirely. I should wish to add also, that some of those hollow cups which were made were absolutely, in some instances, made of wood in order to try the effect, having been disappointed with the proper material; and those that were most unshapely were, in fact, made of wood, which was made fire-proof at the time by proper materials when the right supply did not come. The other advance that has been made in respect to the lighting has been the removal, under the authority of the sub-committee, of the stained glass from a complete window; that is, four panels on either side; and several arrangements have been made on the east window, which, I trust, may be brought into operation to-night. These are intended especially to diminish the shadow that is produced by the bulk of the light in the central panels, and also to give a certain amount of light upon the face of a member rising in the backmost seat. It will be noticed that there is a very great shadow there at present; the projection of the second seat not being amenable, as it were, to the light from the ceiling, but being without its reach; therefore it is very desirable to give some addition there.

2010. These are amongst the alterations that you contemplated in your report which you made to the House?—They are; I never anticipated that I could be able from the central panels to light the back seats to a sufficient extent for a member rising to address the House, and therefore some mode would be required to increase the illumination there.

2010. But these are amongst the alterations that you contemplated when you gave the House the estimate of £2800?—They are.

(To be continued.)

Advertisements.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

LOSH, WILSON, and BELL,
NEWCASTLE-ON-TYNE,
Manufacturers of Bar Iron, Railway Bars, Forge and Engine Work, Cast Iron Goods, and STEWART'S PATENT CAST IRON GAS AND WATER PIPES.
Office, No. 7, Size-lane, London.

WEST and GREGSON,
GAS METER MANUFACTURERS, BRASSFOUNDERS, &c., UNION-STREET, OLDHAM.
Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.

BRYAN DONKIN and CO.'s improved GAS VALVES have been adopted by the principal Gas Companies in London and the United Kingdom, and their advantages and great security fully proved. Very large numbers are in use at various Gas Works; also for Water and Steam Works, the latter with brass fittings. The Gas Valves at 11s. 6d. to 14s. per inch diameter.—Engineers' Works, near Grange-road, Bermondsey, London.

PATENT FLEXIBLE GAS TUBING.

JAMES LYNE HANCOCK'S Vulcanized Indiarubber Hose Pipes and Tubing. Manufactory (and Warehouse), Goswell-mews, Goswell-road, London.

Gas Companies, Engineers, Gas Fitters, and the Trade generally, are respectfully informed this Tubing is now manufactured to any size, from ¼ inch bore and upwards, in 100-feet lengths, and perfectly cylindrical, either with or without a spiral wire inside.

VULCANIZED GLAZED FLEXIBLE TUBING, from ¼ inch up to 1 inch diameter, made in 24-feet lengths; or, covered with silk or worsted, up to 100 feet.

VULCANIZED HOSE, for FIRE ENGINES, BREWERS' USE, and for standing great pressures, (Rubber and Cloth combined), made to any length or size to fit the necessary screws, &c.

VULCANIZED INDIARUBBER AIR-TIGHT BAGS, made any size, for Gas Mains, with flexible tubes attached, and fitted with stopcocks complete.

WM. DONALD and CO.,
MANUFACTURERS OF IMPROVED GAS METERS,
35, BRITANNIA STREET, CITY ROAD, LONDON.
N.B.—These Meters have the Adjusting Slide and Hydraulic. Testimonials can be given from London and Provincial Gas Companies.

METER INDICES.

J. CLUER, Gas Meter, Index Maker, and Model Machinist, No. 1, Bowling-green-lane, Clerkenwell, London.

INDICES and all other Apparatus for Gas Meters of every size and kind, made on the shortest notice, of the best metal, and of superior workmanship.

H. JONES, Gas Meter Manufacturer, No. 44, OLD-STREET, St. Luke's, London, begs respectfully to call the attention of Gas Companies to his latest improvements in the WET METER, by means of which water cannot be abstracted, neither can Gas by any possibility pass through the Meter without registering.

CARTER'S PATENT SAFETY GAS VALVES.

THOMAS LAMBERT and SON, PATENTEES AND MANUFACTURERS,
SHORT STREET, NEW CUT, BLACKFRIARS, LONDON.
The Bank of England is fitted entirely with these Valves, from the smallest branch to the largest main pipe.

The following, among numerous testimonials, will be found very satisfactory:—

"The British Gaslight Company's Office, No. 105, Broad-street, Ratcliff, London, June 10, 1846.

"Gentlemen,—In reply to your inquiry, I have to state that 'Carter's Patent Gas Valve' has been used by this company and by the fitters of the district extensively for seven years past. It was adopted to obviate the inconvenience of setting fast, so prevalent with the conical metal plug-cocks, and has been found to answer the purpose intended.

"I have recommended its use in several provincial towns with which I am professionally connected, and have not received any complaint of its having failed in any respect of performing satisfactorily all that is required of it.

"I am, gentlemen, yours respectfully,
"GEDDIE PEARSE.

"Messrs. Lambert and Son, Lambeth."

ESTABLISHED IN 1834.

S. KING, Gas Meter Manufacturer, 21, Cock-lane, West Smithfield, London.
Meters made of the best materials and workmanship, with all the recent improvements, and warranted correct in registration.

M. SHEEN, Gas and Railway Lantern Maker, 90½, Holborn-hill, begs to inform Managers of Gas Works, &c., that she continues to contract and supply Lanterns on reasonable terms, and keep them in repair by the year.

UNIVERSITY COLLEGE, LONDON.
SESSION 1852-53.
MECHANICAL PRINCIPLES OF ENGINEERING.
Professor EATON HODGKINSON, F.R.S.

Lectures on the Strength of Materials, and on Machinery—Mondays and Thursdays during the Months of December and January, commencing on the 6th of December, the Christmas vacation excepted, from Seven to Eight P.M. Fee, £2. 10s. College Fee, 5s.

A Course of Twelve Lectures will be given on the Strength of Materials in general, as Wrought and Cast Iron, Stone, Timber, &c., with their uses in constructions. These Lectures will include recent researches on the strength of Columns and of Iron Beams; on the tensile, crushing, and transverse strength of Materials, particularly Cast Iron, with the leading results of the late Government Commission upon the subject; and on the defect of Elasticity of Bodies. The Lectures will likewise include the Theory of Bridges, particularly that of Suspension Bridges, with an account of those at Bangor and Freyburg; and of Tubular Bridges, with the experimental and other researches made preparatory to the erection of the Britannia and Conway Tubular Bridges.

N.B.—A more Elementary Course of Lectures, adapted to those who are commencing the study of Practical Engineering, will be given, if an adequate Class be formed. The Professor proposes in this Course to discuss the theory of the various forms of Water Wheels, of Turbines, of Windmills, and of Steam-engines, together with collateral subjects connected with them.

These Lectures are open to gentlemen who are not otherwise Students of the College, as well as those who who are.

JOHN HOPPUS, Ph. D.,
Dean of the Faculty of Arts and Laws.
CHAS. C. ATKINSON,
Secretary to the Council.
November, 1852.

Share List.

(Directors and Managers of Gas Works are earnestly requested to enable us to rectify any errors and fill up the omissions in the following List.)

The Companies whose names are printed in italic type are incorporated by Act of Parliament.

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£	**ENGLAND.**	£ s. d	£ s. d	£ s. d
		Aberdare			
		Aberystwith			
		Abingdon			
		Accrington £7000		5 0 0	
		Albrighton			
		Alcester			
		Alford, Lincolnsh.			
		Alfreton			
		Alnwick			
		Alston Moor			
250	10	Alton	10 0 0	5 0 0	10 0 0
800	5	Altrincham	5 0 0	6 0 0	
		Amlwch			
160	10	Ampthill	10 0 0	5 0 0	10 0 0
350	10	Andover	10 0 0	6 0 0	11 0 0
		Appleby			
		Arundel			
		Ashbourn, Derby.			
		Ashburton			
		Ashby-de-la-Zouch			
		Ashford, Kent			
1600	25	*Ashton-under-Lyne*	25 0 0	10 0 0	52 0 0
		Atherstone			
		Axminster			
200	20	Aylesbury	20 0 0	5 0 0	21 0 0
		Aylsham, Norfolk.			
		Bacup, Lancashire.			
		Bakewell			
		Baldock			
140	25	Banbury	25 0 0	10 0 0	50 0 0
		Bangor			
500	5	Barking, Essex	4 10 0	5 11 0	5 0 0
250	10	Barnard Castle	10 0 0	5 10 0	10 15 0
		Barnet			
		Barnsley £6000		7 10 0	
100	20	Barnstaple	20 0 0	5 0 0	23 0 0
		Barton			
120	25	Basingstoke	25 0 0	8 0 0	28 0 0
2400	20	*Bath*	16 0 0	6 0 0	25 to 30
		Battle £2000		6 0 0	
56	26½	Bawtry	26 10 0	5 0 0	25 0 0
		Beaumaris			
		Beccles, Bungay, and Lowestoft			
300	30	Bedford	25 0 0	4 0 0	20 0 0
		Bedworth			
		Belford			
		Bedale, Yorkshire			
		Belper			
		Beminster			
		Berkhempstead			
700	5½	Berwick-on-Tweed	5 10 0	6 8 0	5 15 0
		Beverley			
		Bewdley			
280	10	Bideford	10 0 0	6 0 0	10 10 0
		Biggleswade			
160	10	Bicester	10 0 0	5 0 0	10 0 0
		Bilston £15,100		8 0 0	
		Billericay			
		Bingley £7400		4 0 0	
		Birkenhead £70,000	35 0 0	3 0 0	35 to 37
2400	50	*Birmingham and Staffordshire*	50 0 0	10 0 0	103 to 105
	25	*Ditto*, new shares	7 10 0	10 0 0	10 pm.
928	75	*Birmingham*	75 0 0	10 0 0	155 to 158
		Bishop's Auckland			
140	25	Bishop's Stortford	25 0 0	5 0 0	24 0 0
		Blackburn £30,000		10 0 0	
		Blackpool			
		Blandford			
		Blythe			
		Bodmin			
		Bognor			
		Bolton £38,582		9 19 5	
		Boroughbridge			
		Boston £8000		10 0 0	
200	10	Bourn	10 0 0	5 0 0	
		Brackley			
		Bradford, Wilts.			
		Bradford, Yorksh. £45,000		9 10 0	
		Brampton, Cumb.			
		Brandon, Suffolk			
		Brecon			
		Bridge-end, Glam.			
		Brierly Hill			
2250	20	*Brighton*	20 0 0	5 0 0	15 to 17
1125	20	„ new shares	16 0 0	5 0 0	10 to 12
		Brighton and Hove £50,276		3 10 0	
4250	20	*Bristol*	20 0 0	9 0 0	37 0 0
1725	25	*Bristol and Clifton*	25 0 0	6 0 0	34 0 0
		Brixham			
		Braintree			
750	50	*Brentford*	50 0 0	6 0 0	44 to 46
800	25	„ new shares	11 0 0	6 0 0	11 0 0
		Brentwood			
200	30	*Bridgwater*	30 0 0	5 0 0	30 0 0
400	10	Bridlington	10 0 0	5 0 0	10 0 0
		Bridport			
		Brigg			
		Broadstairs			
100	50	Bromley, Kent	50 0 0	6 0 0	52 10 0
		Bromsgrove			
		Broughton			
120	10	Bruton	10 0 0	4 0 0	8 0 0
		Brynmawr			
100	25	Buckingham	25 0 0	5 0 0	25 0 0
		Bungay (see Becls.)			
		Burford			
		Burnley £19,946		4 10 2	
		Burslem & Tunstall			
		Burton-on-Trent			
		Bury, Lanc. £6570			
		Bury St. Edmund's		5 0 0	
200	10	Buxton	10 0 0		
		Callington			
		Calne, Wilts			
		Camborne			
		Cambridge £34,560		7 0 0	
240	50	*Canterbury*	50 0 0	6 0 0	57 to 58
240	25	*Ditto*, second issue	25 0 0	6 0 0	28 to 29
		Cardiff £12,000		7 10 0	
		Carmarthen			
		Castleford			
		Chapel on the Frith			
		Chard			
		Chatteris			
		Cheadle			
		Chelmsford			
		Cheltenham £18,732		8 10 0	
		Chepstow			
		Chertsey			
230	10	Chesham, Bucks	10 0 0		
		Chester			
		Chester-le-Street			
		Chesterfield £13,123		4 17 6	
240	25	Chichester	25 0 0	6 0 0	30 0 0
		Chippenham			
		Chipping Norton			
		Chirk			
		Chorley			
		Christchurch			
		Chudleigh			
		Cirencester			
		Clifton (Bristol and			
		Cleckheaton, York.			
		Clitheroe			
		Cockermouth			
		Colchester			
		Collumpton			
		Colne, Lancashire			
		Coleford, Gloucest.			
		Coggeshall			
		Congleton £5000		5 0 0	
		Cowbridge			
		Corsham			
800	25	*Coventry*	25 0 0	6 0 0	24 to 25
		Cowes			
		Crewkerne			
		Croydon ... £20,000		5 0 0	
		Cranbrook ... £1900		5 0 0	
		Crayford & Bexley			
		Crediton			
		Crewe, Cheshire			
		Cricklade			
		Dalton			
		Darlaston			
		Darlington			
250	20	Dartford	20 0 0	7 10 0	27 0 0
		Dartmouth			
125	20	Daventry	20 0 0	6 0 0	24 8 0
		Dawley, Salop			
		Dawlish			
		Dedington			
500	6	Denbigh	6 0 0	5 0 0	6 0 0
820	10	Deptford	10 0 0	5 0 0	1 to 2
325	50	*Derby*	50 0 0	10 0 0	78 0 0
90	20	Dereham (East)	20 0 0	4 10 0	
1000	5	*Dewsbury*	5 0 0	10 0 0	8 12 6
		Devizes			
4000	5	*Devonport*	5 0 0	6 0 0	6 5 0
280	25	Dorchester	25 0 0	5 0 0	30 0 0
120	25	Dorking	20 10 0	5 0 0	21 10 0
		Douglas, Isle of M.			
209	56½	*Dover*	56 10 0	5 15 0	71 to 72
		Downham			
		Driffield			
		Droitwich			
600	20	*Dudley*	20 0 0	4 0 0	20 to 22
		Droylsden			
		Dunmow			
		Dunstable			
		Durham			
276	9	Dursley, Gloster	9 0 0	5 10 0	8 0 0
300	10	Eastbourne			
		East Grinstead			
		Elland			
		Ellesmere			
		Eltham			
		Emsworth			
		Enfield			
300	19	Epsom and Ewell	19 0 0		
		Evesham			
		Exeter £40,000		10 0 0	
		Exmouth			
		Eye, Suffolk			
		Fairford			
64	25	Fakenham	25 0 0	5 0 0	25 0 0
		Falmouth			
		Fareham			
120	25	Farnham	25 0 0	10 0 0	42 0 0
		Farringdon			
		Faversham			
		Ferrybridge			
		Filey			
		Fleetwood			
300	10	Folkestone	10 0 0	10 0 0	15 0 0
240	10	„ new shares	8 0 0	10 0 0	13 0 0
		Fowey			
240	5	Framlingham	5 0 0	5 0 0	5 0 0
		Frome			
		Garstang			
		Gillingham, Dorset			
		Glastonbury			
		Glossop ... £10,000		9 0 0	
1000	25	*Gloucester*	25 0 0	7 10 0	28 0 0
		Gomersal			
		Godalming			
		Gorleston and Southdown			
		Gosport			
		Grantham			
		Gravesend	20 0 0	5 0 0	21 0 0
1000	10	*Great Grimsby*	8 0 0	8 0 0	12¾ to 13¼
	25	Guildford	25 0 0	4 0 0	20 0 0
		Guisborough			
		Hadleigh			
		Hales Owen			
300	6	Halesworth	6 0 0	7 10 0	5 10 0
		Halifax £15,000		10 0 0	
		Halstead			
		Hampton Court			
		Harrogate £10,000		5 0 0	
		Harrow on the Hill			
	5	*Hartlepool* £15,137	5 0 0	7 10 0	7 5 0
		Haslingden, Lansh.			
330	50	Hastings and St. L.	50 0 0	6 0 0	60 0 0
		Havant			
		Haverhill			
		Haworth, Yorks.			
		Hayle			
		Helstone			
		Hemel Hempstead			
300	10	Henley-on-Thams.	10 0 0		
		Hereford £5300		4 0 0	
		Herne Bay			
270	10	Hexham	10 0 0	7 0 0	12 0 0
		Heywood £10,000		5 0 0	
		Highworth (Wilts)			
230	10	Hinckley	10 0 0	5 0 0	7 0 0
		Hindley, Lancash.			
		Hitchen			
		Hythe			
		Hoddesden			
		Holbeach			
		Holmfirth £8880		3 10 0	
		Holyhead			
		Holywell (see British Provincial)			
		Honiton			
		Horbury			
		Horncastle			
		Horsforth			
	10	Houghton-le-Sprg.	10 0 0	8 0 0	
		Horsham			
		Howden			
		Hull, Sculcoats (see British Provin.)			
		Hull, £11,712. 10s.		5 0 0	
		Hunmanby			
210	10	Hungerford	10 0 0	5 0 0	10 0 0
		Huddersfield			
520	5	High Wycombe	5 0 0	6 0 0	6 16 0
		Idle and Eccleshill			
		Ilkeston			
		Ilminster			
		Ilford			
		Ilfracombe			
		Ironbridge			
1400	10	*Ipswich*	10 0 0	8 0 0	15 0 0
1400	10	„ new shares	7 10 0	8 0 0	12 10 0
800	25	*Isle of Thanet*	20 0 0	5 0 0	20 to 21
		Kendal £9100		8 15 0	
		Kenilworth			
		Keswick			
100	25	Kettering	25 0 0	5 0 0	25 0 0
		Kiddermins. £10000		5 0 0	
		King's Langley			
		Kington, Hereford			
		Kirkby Lonsdale			
		Kirkham, Lanc.			
		Knighton			
		Knutsford			
		Lancaster			
		Llanelly £3000		5 0 0	
		Llandovery			
		Leamington Priors £22,500		6 0 0	
		Leatherhead			
		Ledbury			
		Leeds Old Comp. old stk., £60,300		10 0 0	
		new „ £23,775		6 0 0	
		Leeds New £60,000		10 0 0	
		Leek			
		Leicester ... £36,230		7 0 0	
		Leigh			
135	20	Leighton Buzzard	20 0 0	5 0 0	
		Leominster			
		Leyburn, Yorksh.			
		Liskeard			
330	25	Lewes	25 0 0	5 0 0	25 0 0
		Lincoln £8000		10 0 0	
		Leyland, Lancash.			
		Littlehampton			
250	20	Lichfield	20 0 0	10 0 0	30 0 0
		Liverpool United	100 0 0	10 0 0	209 to 211
		„ ½ sh.	25 0 0	10 0 0	52 to 53
		Langport			
		London Comps.—			
5000	20	British Provincial (Holywell, Hull, Norwich, Potteries, Trowbridge)	20 0 0	7 0 0	21 to 23
	20	„ Prov., new	14 0 0	7 0 0	15 to 16
4000	25	*Commercial*	25 0 0	6 0 0	30 to 31
2000	25	„ new shares	2 10 0	6 0 0	par to 2pm
		„ deb. £12,000			
12,000	50	*Chartered*	50 0 0	4 0 0	36½ to 37
6000	50	„ new shares	10 0 0	4 0 0	6 to 7
2000	150	*City of London*	150 0 0	4 0 0	123 to 125
4000	50	*Equitable*	50 0 0	2 10 0	25 to 26
		„ deb. £16,000			
10,000	20	European— (Amiens, Boulogne, Caen, Havre, Nantes, and Rouen)	20 0 0	5 0 0	13 to 15
2000	20	„ do. new	7 0 0	5 0 0	6 to 7

Number of Shares issued.	Amount per Shar	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
15,000	10	*Gt.Cntl.Consumers*	10 0 0	10 0 0	14 to 15
		Impl.Continental			
8000	50	—First capital (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam).....	42 0 0	6 11 0	48 to 50
7000	50	Second capital—(Aix la Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Marseilles, Toulouse Vienna)	41 0 0	10 7 0	73 to 75
	50	Third capital ...	43 10 0	9 4 0	70 to 72
10,000	50	*Imperial*	50 0 0	6 0 0	86 to 88
3000	50	„ new shares	45 0 0	6 0 0	81 to 83
		„ deb.£50,500			
4000	40	*Independent* ...	40 0 0	6 0 0	46 to 47
3000	50	*London*	50 0 0		3 0 0
6000	25	„ preference	25 0 0	6 0 0	25 0 0
3000	50	„ 2nd do. ...	50 0 0		15 to 18
9000	50	*Phœnix*	49 0 0	3 10 0	26 to 27
1000	100	*Ratcliff*	90 0 0	5 0 0	65 to 70
4000	25	*South Metrop.* ...	25 0 0	5 0 0	21 to 22
7000	10	Surrey Consumers'	10 0 0	6 0 0	
9000	50	United General—(Cork, Dublin, Limerick)	50 0 0	2 0 0	21 to 22
6406	20	Western A shares	20 0 0	2 0 0	19 0 0
3500	20	„ B „	10 0 0	2 0 0	
		Lostwithiel			
		Loughborough.....			
240	25	*Louth*.....	25 0 0	6 0 0	26 10 0
		Lowestoft (see Bec.			
611	5	Ludlow Union.....	5 0 0	6 0 0	5 0 0
		Luton.....			
		Lutterworth.....			
		Lyme Regis			
		Lymington			
		Malmesbury.....			
		*Macclesfield*32,000		3 15 0	
		Maidenhead.....			
360	50	*Maidstone*	50 0 0	10 0 0	90 0 0
		Maldon			
		Marlborough			
		Malton (New).....			
		Malvern.....			
		Manningtree			
		Mansfield £5000		10 0 0	
		March			
		Margate(see I. of T.			
		Market Deeping...			
		Market Drayton ...			
132	25	Market Harboro'	25 0 0	6 0 0	30 0 0
		Market Raisin.....			
		Market Weighton			
		Marlow			
370	10	Maryport	10 0 0	6 0 0	12 0 0
		Matlock			
		Melksham.....			
		Melton Mowbray .			
		Merthyr Tydvil ...			
		Mere			
		Middleton £9033		5 0 0	
		Midsummer Norton			
		Middlesboro'			
		Mildenhall			
700	10	Mitcham	10 0 0	10 0 0	14 10 0
		Mold			
700	10	Monmouth	10 0 0	5 0 0	
		Monk Wearmouth			
		Moreton in Marsh			
		Morley			
		Mottram			
		Morpeth			
		Nantwich			
		Neath.....			
		Needham Market..			
		Newark..... £5000		10 0 0	
250	20	Newbury	20 0 0	5 0 0	20 0 0
13,000	5	Newcastle & Gateshead Union	5 0 0	8 0 0	7 15 0
		Newcastle-under-Lyne £6200		4 0 0	
600	5	Newmarket	5 0 0	6 0 0	5 0 0
		Newnham, Glost.			
		Newent			
		New Mills £2115			
		Newport, M. £11720		8 0 0	
320	50	*Newport, Isle of W.*	38 0 0	4 0 0	5 0 0
		Newport Pagnell ...			
		Newport, Salop ...			
		Newton Abbot.....			
		Newton, Lanc.....			
		Northallerton.....			
		North Walsham ...			
542	20	*Northampton*	18 0 0	10 0 0	27 0 0
		Northwich			
		Norwich (see British Pro. £40,000		7 0 0	
900	50	*Nottingham*	50 0 0	10 0 0	
900	50	New shares		10 0 0	
		Nuneaton			
		Oakham.....			
		Oakhampton			
200	10	Odiham, Hants.....	10 0 0	4 0 0	10 0 0
		Oldham			
		Olney			
		Ongar			
		Ormskirk			
		Otley, Yorkshire..			
		Oundle			
120	150	*Oxford*	150 0 0	8 0 0	260 0 0
		Over Darwen £8000		5 0 0	
		Padstow			
		Pately Bridge, Yrk.			
250	20	Penrith	15 0 0	6 10 0	21 0 0
		Penryn			
		Penzance			
200	10	Petworth	10 0 0	8 0 0	12 0 0
		Petersfield			
		Pickering			
3000	10	*Plymouth*	10 0 0	10 0 0	11 0 0
		Pocklington			
		Pontefract.....			
		Pontypridd			
400	10	Poole	10 0 0	5 0 0	10 0 0
		Port Madoc.....			
600	50	*Portsea Island* ...	53 0 0	5 0 0	50 to 51
400	10	Prescott.....	9 0 0	4 13 4	7 0 0
3000	20	*Preston*	20 0 0	10 0 0	
		Pwllheli.....			
		Pudsey ...£12,000		5 0 0	
		Radcliff and Pilkington £9000		4 12 10	
		Ramsay, I. of Man			
		Ramsgate(see I. of T			
		Ravenglass			
1000	10	*Reading*.....	10 0 0	4 0 0	7 0 0
500	20	*Reading Union* ...	20 0 0	6 0 0	17 0 0
		Redditch			
		Redruth.....			
		Reigate			
		Retford (East).....			
		Rhyl			
		Richmond (Surrey)			
		Rickmansworth ...			
		Ringwood			
		Ripon.....			
		Rochester and Chatham £20,000		6 0 0	
		Rochford			
		Rockingham.....			
		Romford			
		Ross			
215	25	*Rotherham*	25 0 0	6 0 0	39 to 41
		Royston.....			
		Ruabon			
		Rugby			
		Rugeley.....			
		Runcorn... £11,000		7 10 0	
		Ruthin			
500	10	Ryde	10 0 0	6 0 0	12 0 0
		Rye.....			
		Romsey			
		Saddleworth.....			
225	20	Saffron Walden ...	20 0 0	3 15 0	19 0 0
		St. Austel			
		St. Asaph			
		St. Colomb			
		St. Helen's £7500		7 10 0	
		St. Helier's (Jersey)			
		St. Ives, Hunting.			
		St. Ives, Cornwall			
250	10	St. Neot's	10 0 0	8 0 0	12 0 0
		St. Peter's Port, (Guernsey)			
320	25	Salisbury	25 0 0	6 0 0	28 to 30
		Sandbach			
140	10	Saxmundham	10 0 0	5 0 0	10 0 0
		Scarborough.....			
		Sedburgh			
		Selby			
		Settle			
290	10	Sevenoaks.....	10 0 0	5 0 0	10 0 0
		Shaftesbury			
5400	25	*Sheffield United* ...	24 0 0	8 6 8	27 to 27½
		Shelton, Potteries (see Brit. Prov.)			
		Shepton Mallet ...			
		Sherborne			
2914	5	Shields (Tyne)...	5 0 0	3 0 0	5 0 0
		Shields (South) ...			
		Shiffnal, Salop			
1000	5	*Shipley*	5 0 0	6 0 0	5 12 6
		Shipston-on-Stour			
		Shoreham			
		Shrewsbury£10,000		7 0 0	
400	10	Skipton	10 0 0	4 0 0	11 0 0
		Sleaford			
250	10	Slough	10 0 0		
		Snaith			
		Soham			
		Southwold.....			
		South Molton			
1000	50	*Southampton*	32 0 0	5 0 0	
		Sowerby, Yorksh.			
		Staindrop			
		Stretford			
		Stokesly.....			
		Stafford £10,000		5 0 0	
		Staines and Egham			
		Staley Bdg.£15,000		10 0 0	
		Stamford £11,250		3 0 0	
		Stockton-on-Tees £7980		9 5 0	
840	9½	Stockton, New	9 10 0	9 0 0	8 0 0
960	10	Stoke-upon-Trent	10 0 0	7 0 0	11 10 0
500	10	„ new shares	6 0 0	7 0 0	7 10 0
		Stone, Stafford.....			
		Stoney Stratford ...			
		Stourbridge			
		Stowmarket.....			
150	20	Stratford-on-Avon	20 0 0	7 10 0	30 0 0
		Stroud			
169	10	Swaffham.....	10 0 0	5 0 0	5 10 0
		Swansea £9000			
		Sudbury.....			
		Sunderland, old.....			
6400	5	*Sunderland*, new ..	5 0 0	5 0 0	5 5 0
		Sutton			
		Sutton-in-Ashfield			
		Swindon.....			
		Sydenham.....			
2800	5	*Taunton*.....	5 0 0		
		Tadcaster			
		Tamworth.....			
		Tavistock.....			
		Teignmouth.....			
		Tenbury.....			
		Tenby.....			
		Tenterden £2000		2 10 0	
		Tetbury, Gloster...			
		Tewkesbury			
		Thame			
		Thetford			
		Thirsk			
		Thornbury.....			
		Thorne.....			
		Tiverton			
670	5	Todmorden	3 0 6		
		Topsham			
		Torquay.....			
		Torrington, Devon			
		Totnes			
		Totnes Consumers			
4000	5	Tottenham	3 10 0	6 0 0	3 0 0
		Towcester.....			
		Town-Malling.....			
200	10	Tring	10 0 0	5 0 0	10 0 0
		Trowbridge (see British Provin.)			
75	50	Truro	50 0 0	2 0 0	
		Tunbridge.....			
		Tunbridge Wells...			
		Ulverston.....			
		Uppingham			
240	5	Upton-on-Severn	5 0 0	5 0 0	5 0 0
		Usk, Monmouth ...			
		Uttoxeter.....			
		Uxbridge			
		Ventnor.....			
1000	25	*Wakefield*, old capl.	25 0 0	6 0 0	25 0 0
1600	5	„ new „	5 0 0	6 0 0	5 0 0
		Wallasey.....			
300	10	Wallingford	10 0 0	5 0 0	8 0 0
		Wandsworth.....			
		Wantage.....			
		Warrington £23304		10 0 0	
100	10	Wareham	10 0 0	3 10 0	8 0 0
120	25	Warminster	25 0 0	5 0 0	27 0 0
		Warth			
		Warwick £15,000		6 0 0	
		Watford.....			
		Welchpool, Mntgy.			
		Wellingborough...			
		Wellington, Salop			
		Wellington, Smrst.			
		Wells, Smrst.£5000		7 10 0	
		Westbury.....			
		Weston-sup.-Mare			
2000	5	West Ham	5 0 0	6 0 0	5 0 0
		Whitby			
		Whitehaven			
		Whitstable			
		Whittlesea			
		Wigan £10,160		10 0 0	
		Willenhall.....			
		Winchelsea.....			
		Winslow			
240	10	Wimborne Minster	10 0 0		
		Wimbledon			
		Wincanton.....			
360	50	Winchester	50 0 0	6 0 0	
900	12½	Windsor.....	12 10 0	10 0 0	23 0 0
		Witham.....			
		Witney.....			
4448	10	*Wolverhampton* ...	10 0 0	7 10 0	17 10 0
200	10	Woburn.....	10 0 0	5 0 0	10 0 0
210	10	Wokingham	10 0 0		10 0 0
		Woodbridge			
		Wooler			
		Wotton-un.-Edge			
		Worcester £29,000		8 0 0	
		Workington			
		Worksop & Radford			
		Wirksworth			
		Worthing.....			
		Wrexham			
		Woolwich Equitbl.			
		Woolwich Consms.			
		Woolwich (North)			
		Wymondham.....			
		Yarm			
795	20	Yarmouth.....	20 0 0		17 to 18
		Yeadon, near Leeds			
		Yeovil			
		Fork Untd. £55,000		7 0 0	
		SCOTLAND.			
	5	Aberdeen	3 0 0		3 16 6
		Airdrie			
		Alloa			
		Annan			
		Anstruther.....			
		Ardrossan			
550	20	Arbroath	20 0 0	7 10 0	27 10 0
		Auchterarder.....			
750	2	Auchtermuchty	2 0 0	6 0 0	2 7 6
		Ayr, old			
		Ditto, new.....			
		Banff.....			
		Barrhead			
		Bathgate.....			
		Beith.....			
		Bervie			
		Biggar			
		Blairgowrie			
400	6	Borrowstowness ...	6 0 0	5 0 0	8 0 0
		Brechin			
		Bridge of Allan ...			
	2	Broughty Ferry ...	2 0 0	5 0 0	2 0 0
		Burntisland			
		Campbelton			
		Clackmannan			
		Coatbridge.....			
		Coldstream			
		Collinsburgh			
		Comrie			
		Crieff.....			
		Crail, Fife			
		Cullen			
		Cumbernauld			
		Cumnock			
600	5	Cupar Angus	5 0 0	6 0 0	5 10 0
250	10	Cupar Fife	10 0 0	7 10 0	14 0 0

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
		Dalkeith			
		Denny			
		Dingwall			
		Dornoch			
		Douglas			
		Dumbarton			
400	20	Dumfries	14 0 0	5 0 0	20 0 0
		Dunbar			
		Dunblane			
	23¾	*Dundee, old* £29,687	23 15 0	8 8 0	30 10 0
8000	5	*Dundee, new*	5 0 0	4 0 0	4 0 0
860	10	Dunfermline	10 0 0	6 0 0	12 12 0
		Dunkeld			
		Dunoon			
		Dunse			
		Dysart			
6000	25	*Edinburgh Gas Co.*	25 0 0	10 0 0	52 10 0
	25	*„ and Leith Co.* £98,640	18 0 0	7 10 0	27 13 6
		Elfe			
		Elgin			
		Falkirk, old			
		„ new			
		Falkland			
		Ferry Port on Craig			
		Fochabers			
		Forfar			
		Fort William			
		Fraserburgh			
		Galashiels			
		Garlieston			
		Gatehouse n. Fleet			
		Girvan			
	25	*Glasgow* £122,500	25 0 0	10 0 0	50 0 0
15000	10	*Glasgow City and Suburban*	10 0 0	9 0 0	19 17 6
		Grangemouth			
		Grahamston			
		Haddington			
		Hamilton £7500		8 0 0	
		Hawick			
		Helensburgh			
		Huntly			
		Inverary			
400	1	Inverkeithing	1 0 0	5 0 0	1 0 0
1200	10	*Inverness Gas and Water*	10 0 0	7 10 0	15 0 0
2400	5	*„* new shares	1 5 0	7 10 0	2 5 0
		Irvine			
		Jedburgh			
		Johnstone (Paisley)			
		Keith			
		Kelso		10 0 0	
		Kilmarnock			
		Kincardine			
		Kinghorn			
		Kingskittle, Fife			
		Kinross			
		Kirkaldy			

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
320	5	Kirkcudbright	5 0 0	5 0 0	5 0 0
1000	3	Kirkintulloch, near Glasgow	3 0 0	5 0 0	3 0 0
227	5	Kirkwall	5 0 0	5 0 0	4 10 0
518	5	Kirriemuir	5 0 0	6 0 0	
		Lanark			
		Largo, near Leven			
		Largs			
		Lasswade, n. Edin.			
		Lauder			
		Leith			
		Leslie, Fife			
		Lesmahago			
		Leven			
		Linlithgow			
		Linton, n. Nobleh.			
		Lochee, n. Dundee			
		Lochgilphead			
		Lochwinnock, near Paisley			
1200	1	Markinch	1 0 0	7 10 0	1 5 0
		Mauchline			
		Maxwell-town, n. Dumfries			
		Maybole, Ayrshire			
		Maryhill, near Glasgow			
		Melrose			
718	2	Mid & East Calder	2 0 0		2 0 0
192	5	Moffat	5 0 0		
	13½	Montrose	13 10 0	7 11 1	
		Musselburgh			
		Nairn			
		Neilston, n. Glasg.			
		Newmills, near Kilmarnock			
		Newburgh, Fife			
		Newton-on-Ayre			
		Newton Stewart			
		North Berwick, n. Haddington			
		North Queensferry			
		Oban			
		Peebles		4 16 0	
800	25	Perth	25 0 0		22 10 0
5		„ new	5 0 0		2 7 6
		Peterhead			
		Pittenweem			
		Pollokshaws, near Glasgow			
		Port Glasgow			
		Portobello, n. Edin.			
		Prestonpans			
		Rutherglen, near Glasgow			
		Renfrew, n. Paisley			
		Saltcoats			
		Sanquhar			
		Selkirk			

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
		South Queensferry			
		St. Andrew's			
		Stewarton			
		Stirling			
		Stonehaven			
		Stonehouse, Lanrks.			
		Stornoway			
		Stranraer			
		Strathaven, near Hamilton			
		Thurso			
		Tillicoultry, n. Alloa			
800	1	Tranent	1 0 0		1 0 0
		Troon			
		Wick			
		Wigton			
		Wemyss	4 10 0		
		IRELAND.			
300	10	Armagh	10 0 0	8 0 0	14 10 0
		Ballinasloe			
700	50	*Belfast*	50 0 0		
		Ballymena			
		Ballymoney			
		Carrickfergus			
		Carlow			
		Cavan			
		Cork (see Un. Gen.)			
		Cookstown			
1300	5	Clonmel Consumrs	5 0 0	5 0 0	5 0 0
		Drogheda			
19,000	10	*Dublin Consumers*	6 0 0	7 0 0	8 10 0
		Dublin Hibernian (see United Gen.)			
160	25	Dundalk	25 0 0		22 0 0
		Dungannon			
871	5	*Downpatrick*	5 0 0	4 0 0	
		Enniskillen			
		Enniscorthy			
240	25	Galway	25 0 0	10 0 0	32 0 0
400	10	Kilkenny	10 0 0	8 0 0	11 5 0
		Larne			
		Limerick (see U.G.)			
1725	5	Limerick Consum.	5 0 0	5 0 0	5 0 0
600	15	Londonderry	15 0 0	6 13 4	21 10 0
500	7	Lisburn	7 0 0	7 10 0	8 5 0
520	10	Lurgan	6 0 0	6 0 0	6 0 0
		Mallow			
		Monaghan			
		Nenagh			
448	5	Newtownards	5 0 0	4 0 0	5 0 0
		Newtownlimavady			
		Newry			
		Omagh			
125	20	Portadown	20 0 0	6 0 0	20 0 0
600	10	Sligo	10 0 0		
		Tipperary			
		Tralee			
		Waterford			

The Gas Works in the undermentioned towns belong to private individuals:—

Abergavenny.	Ely.	Hertford.	New Ross.	Pontypool.	Sidmouth.	Wem.
Bridgenorth.	Farsley.	Holt.	Northfleet.	St. Alban's.	Sittingbourne.	Wexford.
Carnarvon.	Gainsborough.	Huntingdon.	Newport I. W. (new).	Sandwich.	Spalding.	Weymouth.
Chester, new.	Goole.	Hyde (Cheshire)	Oswestry.	Seaham Harbour.	Waltham Abbey.	Whitchurch (Salop).
Deal.	Harleston.	Kingston-on-Thames.	Peterborough.	Sheerness.	Ware. (2 works)	Wisbeach.
Diss.	Hatfield.	Lynn.				

The Gas Works belong to the Corporations, or to Commissioners acting under special acts of Parliament, in the following towns:—

Carlisle.	Greenock.	Knaresborough.	Milton (Kent).	Rothesay.	Southport (Lanc.)	Walsall.
Cashel.	Haverfordwest.	Lytham (Lanc.)	Paisley.	Richmond (Yorkshire).	Stockport	Wells (Norfolk).
Coleraine.	Keighly.	Manchester.	Rochdale.	Salford.	Strabane.	Youghall.
Doncaster.						

Price Current.

CASTINGS, per Ton.

Average Weight of Cast Iron Gas Pipes, per Yard.

1½ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow	Newcastle.	Wales.	Yorksh., Derbysh., and Staffordsh
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1.	4 0 0	3 7 6	3 15 0	4 10 0	3 15 0
1½ and 2 inches Socket Pipes	7 5 0	6 10 0	6 5 0	6 15 0	6 10 0
2½ and 3 do. do.	7 0 0	6 5 0	5 15 0	6 10 0	6 0 0
4 and 5 do. do.	6 15 0	6 0 0	5 10 0	6 5 0	5 15 0
6 inches and upwards do.	6 10 0	5 15 0	5 5 0	6 0 0	5 10 0
Extra for bends, branches, and connection	2 10 0	2 10 0	2 10 0	2 10 0	2 10 0
Retorts, 2nd fusion, hot blast	6 10 0	5 10 0	5 0 0	6 0 0	5 5 0
Do. 2nd fusion, cold blast	7 0 0	..	5 10 0	6 10 0	5 15 0
Tank Plates, ½ thick and above	6 10 0	5 15 0	5 5 0	6 0 0	5 10 0
Do. less than ½	7 0 0	6 5 0	5 15 0	6 10 0	6 0 0
Plain Castings ex. models	6 15 0	6 0 0	5 10 0	6 5 0	6 15 0

COALS.

NEWCASTLE. Unscreened.	s.	d.	
Whitwell Primrose	4	6	per ton.
Burnhope	5	3	„
Dean's Primrose	5	9	„
Pelton, Brancepeth, Medomsley	6	0	„
Pelaw	6	3	„
Eighton Moor, Felling Main, New Pelton, Peareth, South Pelaw, Waldridge, Washington Hutton, South Peareth	6	6	„
Ramsay's Cannel	12	0	„
Cowen's Cannel	12	0	„

DERBYSHIRE.		
Clay Cross, Deep Main, and New Birchwood	6s.6d.	per ton.
SCOTCH CANNEL.		
Boghead at Leith	19 0	„
Kirkness best	23 0	„
Capeldrae, first quality	20 0	„
Ditto, second quality	10 0	„
Lothian	16 0	„
Lesmahago at Glasgow	16 0	„
Ditto at Leith	17 6	„
Arniston	16 0	„
Wemyss	14 0	„
Donibristle	10 6	„
Bridgeness, Kinneil	11 0	„
Knightswood	10 0	„
Lochgelly, Lumphinan	9 6	„

FIRE GOODS.	
Best Bricks, 50s. per 1000, at Newcastle.	
Do. Clay, 12s. per ton do.	

LEAD.
Soft pig, £19. 10s. to £20 per ton.

WROUGHT IRON TUBING, subject to 30 per cent. Discount.

	2 inches.	1½ inch.	1¼ inch.	1 inch.	¾ inch.	½ inch.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent welded tubes, from 2 to 12 feet, per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto „ 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting pieces, or long screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, springs, and elbows, wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing sockets, caps, plugs, and nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain sockets	1 0	0 8	0 7	0 5	0 4	0 3
Flanches	1 9	1 6	1 3	1 0	0 9	
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 6	
Ditto 1 quart	11 6	10 6	10 3	10 0	9 6	

FREIGHTS, per Ton.

Coastwise—Newcastle.	s.	d.
Chatham & Roches.	7	6
Cork	9	9
Dover	8	6
Dublin	9	0
Exeter Quay	10	0
Folkestone	8	6
Hastings	12	6
Ipswich	7	9
Jersey	10	0
London	7	6
Lowestoft	6	3
Lynn	7	6
Margate	9	0
Portsmouth	10	0
Plymouth	9	9
Southampton	9	3

	s.	d.
Weymouth	9	6
Yarmouth	6	0
Foreign.		
Amsterdam	11	6
Boulogne	9	6
Barcelona	16	6
Bordeaux	14	0
Calais	9	6
Dieppe	10	6
Hamburg	11	0
Havre	11	0
Lisbon	12	0
Rotterdam	10	6
Rouen	13	0
St. Petersburgh	12	0
Stettin	9	0
Trieste and Venice	20	0